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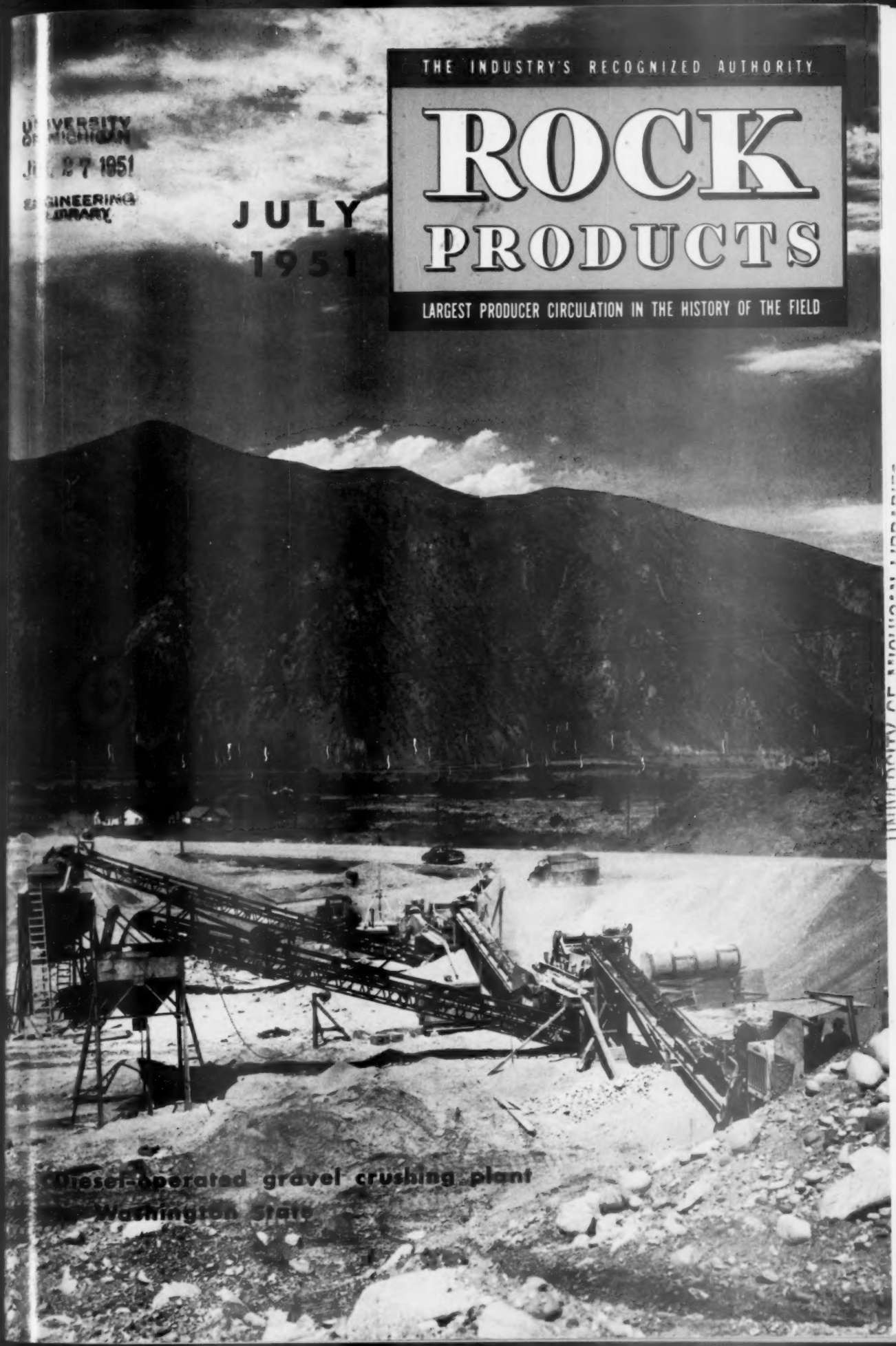
ROCK PRODUCTS

LARGEST PRODUCER CIRCULATION IN THE HISTORY OF THE FIELD

JULY 1951



Diesel-operated gravel crushing plant
Washington State

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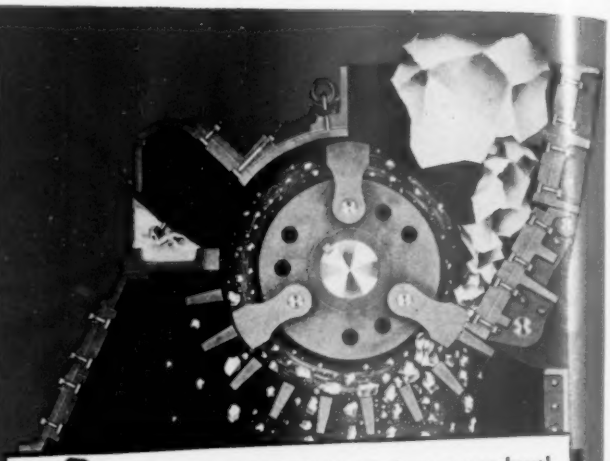
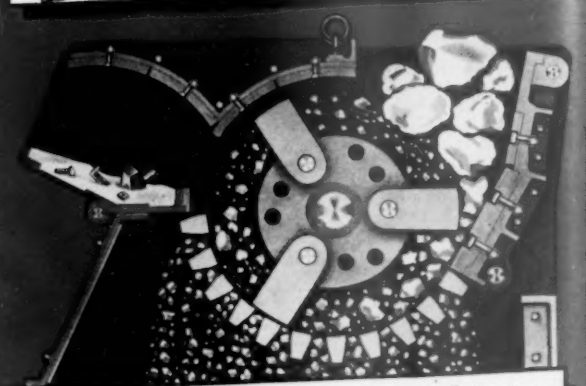
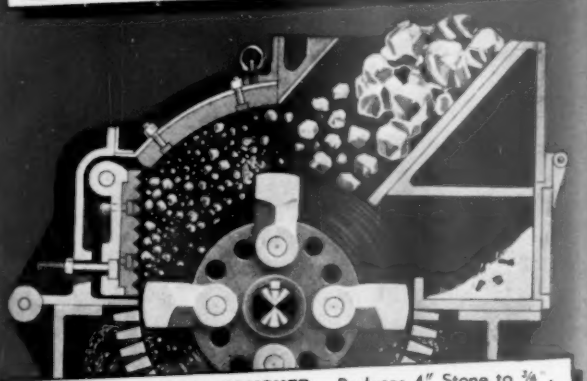
WILLIAMS HAMMERMILLS for the ~~new~~ 1-2-3 PUNCH in the CRUSHED STONE FIELD



1 **The "SUPER SLUGGER"**—Reduces power shovel loaded rock to 1½" or ¾" stone in One Operation. Capacities 65 to 550 tons per hour.



2 **The "SLUGGER"**—Reduces "one-man" size stone (75 to 100 lb. pieces) to 1¼", ¾" or Agricultural Limestone in One Operation. Capacities 4 to 100 tons per hour.



3 **The "NF" CRUSHER**—Reduces 4" Stone to ¾", ½" or Agricultural Limestone in One Operation. Made in a large range of sizes with capacities from 5 to 200 tons per hour.

You save operating costs because stone is crushed to desired size in one operation ... You save installation cost because you eliminate the need for additional machinery, foundations, conveyors, power drives and buildings.

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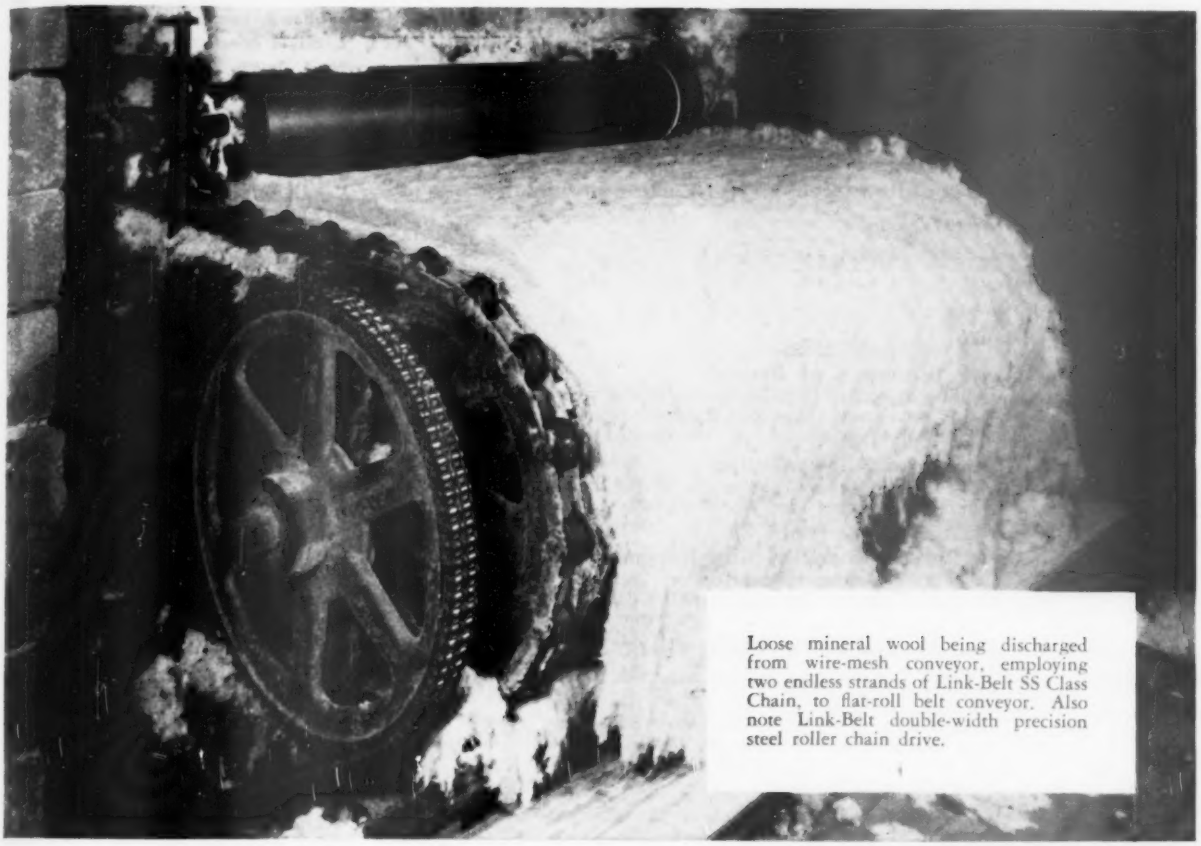

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JULY, 1951

ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 54, No. 7

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

This M

We Hear

Editorial—Agstone Association

Rocky's Notes—Confused Chem

Labor Relations Trends

The Personal Side of the Ne

Industry News

Hints and Helps

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Large mining operation in
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Plant Designed for Low Labor
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Research on Hydraulic Proper
Blast Furnace Slag *Taro Tan*

Selection of V-Belt Drives for

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Nonmetallic Minerals in North
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New Applications of Prestress
Masonry Units
Basalt Rock Co. finds that
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Chicago's Ready Mix Industry C
Material Service Corp. ha
mixing plant and now has
trucks serving city and sub

Selling Block Throughout Wide
Campbell Supply Co., Marquette, Mich., utilizes dealers and advertising, has large capacity mechanized plant

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"WE HEAR..."

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"WE HEAR..."

July, 1951

It was recently reported that naturally occurring beach sands along the California coast contain small but useful amounts of uranium. According to the report, the interesting mystery is--where is the original source of the uranium? The sands are washed up by the ocean, but the ocean gets the sands from land erosion. Where is the possible rich source of uranium from which this material was carried to the ocean as sand?

* * * * * * * * *

The Westvaco Division of Food Machinery and Chemical Corp., New York, N. Y., is constructing a $3,500,000 chemical plant in North Lawrence, Kan., for the production of chemicals from phosphate.

* * * * * * * * *

The trend in the trucking industry toward the use of diesel-powered trucks is continuing at a rapid pace in 1951, according to a report from the GMC Truck and Coach Division. The swing toward diesel was contrasted against sales in 1938, when diesel truck sales totaled only 489, edged up to 2000 in 1946, and then soared to 12,669 in 1950.

* * * * * * * * *

Street and highway officials of Stark county, Ohio, have started the costly job of repairing the "frost damage" to streets and roads caused by the worst winter in many years. Conservative estimates on the price of the projects, ranging from small patch jobs to major construction feats, is expected to total nearly $2,000,000. Funds to purchase materials for the repairs looms as the biggest problem. The maintenance superintendent stated that in all his years of experience, he has never seen the streets and highways in such bad shape as they are today (the editor agrees). Most roads are to get a "patch-job" treatment, but unless more funds are made available, there won't be much done in the way of permanent repairs.

* * * * * * * * *

An additional $800,000,000 has been asked of Congress by President Truman for stockpiling critical raw materials during the fiscal year of 1952. The request was included in an overall request for $1,090,000,000 in supplementary appropriations. So far a total of $4,400,000,000 in obligational authority has been made available for stockpiling.

* * * * * * * * *

It is expected that by mid-July, the U.S. synthetic rubber industry will reach an annual rate of 900,000 long tons, which is three times what the industry was producing before the Korean war outbreak and double the output of last December. It represents over 70 percent of the 1,270,000 tons of all rubber which this country is expected to consume in 1951. World output of both natural and synthetic rubber has been predicted to exceed 2,800,000 tons during 1951.

* * * * * * * * *

Construction in April, 1951, in the 37 states east of the Rockies totaled $1,374,991,000, or 8 percent higher than in the preceding month, and 2 percent higher than in April, 1950, according to an F. W. Dodge Corp. report. The total for the first four months of 1951 was $4,826,216,000, or 16 percent more than the comparable figure for 1950. The biggest gain was in non-residential construction which was up 30 percent over the first four months of 1950. Residential construction was up 8 percent; public and private works and utilities were up 10 percent.

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WE HEAR

Officials of Pulaski county, Ark., recently leased 330 acres of land and have installed crushing equipment for providing their own crushed stone for road construction in that county. It was stated that the county expects to save "thousands of dollars" which have been previously paid to commercial firms for providing the crushed stone which the county uses in large quantities for road repair and new construction.

* * * * * * * * * *

A total of $5,563,000,000 for engineering construction of all classes for the first 19 weeks of 1951 was 42 percent higher than corresponding contract awards last year, as reported by Engineering News-Record. Private construction totaled $3,399,000,000, a gain of 51 percent. Public construction was up 30 percent. Federal contracts were up 56 percent, while state and municipal awards had a gain of 17 percent.

* * * * * * * * * *

A premature blast of dynamite at a Kansas limestone quarry critically injured three workmen and destroyed a bulldozer, two trucks and a power shovel. It was stated that approximately 2200 lb. of dynamite went off, raining rock on the men and equipment in the pit. The accident was attributed to a short in electrical wiring leading to the explosives.

* * * * * * * * * *

To conserve critical materials for defense production, N.P.A., under Schedule 1 of Order M-51, has issued simplified designs of glass containers which may be used by any manufacturer who desires to produce them. The following glass container designs are included: 21 for food; seven for malt beverages; seven for wine bottles; four for distilled spirits; and four for drug and chemical products. Should it become necessary to further limit the use of tin packaging, N.P.A. may require the packaging of specified products in the simplified glass containers.

* * * * * * * * * *

One-hundred reinforced concrete posts, 6 in. sq. and 6 ft. high, will be used as street markers in Barnwell, S. C. The names of the streets will be stencilled on the posts which will be set at the street intersections in Barnwell.

* * * * * * * * * *

New orders, issued May 1, called for the return of box cars to principal western grain-loading railroads. It was stated that the orders have a threefold purpose--making more cars available to those lines confronted with the heavy movement of government grain on which loans matured May 1; increasing the supply of cars available for the movement of the new winter wheat harvest in the Southwest starting in mid-May; and making additional box cars available for other commodities.

* * * * * * * * * *

Following a temporary slump in 1949, it was reported that sales of chemical products rose steadily through 1950 to reach the highest annual peacetime total of $16.6 billion, or $2.8 billion more than in 1949. By the beginning of 1951, monthly sales had increased by approximately 50 percent over December, 1949.

* * * * * * * * * *

Canada has been one or the largest exporters of base metals in the world for the last 30 years. In 1950, its mineral production passed the one-billion-dollar mark, as compared with an estimated $890,000,000 in 1949. It is expected than an annual output of two billion dollars will be achieved early in the second half of this century. Many new mines are being developed. Saskatchewan is completing arrangements for the mining of potash. In Ontario, there is scheduled to be a moderate increase in cobalt mining operations. The Canadian Metal Mining Association is seeking 1500 new employes to work in the mines this summer.

* * * * * * * * * *

It is reported that the national affairs committee of the Associated Equipment Distributors has demanded a nation-wide survey of construction machinery and trained personnel for the purpose of determining the nature and ownership of available construction equipment and location of trained operators. The information would be indexed and made available to authorized civil defense authorities on the national, state and municipal levels of the government.

THE EDITORS

How *PULVERATORS* Put the Squeeze on Aglime Costs

QUALITY LIMESTONE CO., Sussex, Wisconsin, is typical of many limestone crushing plants making added profits by producing agricultural limestone in addition to their regular operations. Operators are highly pleased with *Pulverator* performance for this job . . . because these machines turn out a fine finished product at such a low cost per ton.

The *Pulverator* is designed to utilize the principle that a high velocity square hit is the most powerful breaking blow.

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Revolving flat hammers in the *Pulverator* strike material *squarely and repeatedly*. Hammers hurl the material against a succession of involute breaker plates from which particles rebound until broken. This results in a high ratio of reduction and low power consumption. Material is broken up rapidly into fine, cubical particles.

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"Best Hammermill on the Market, for its Size."

—That's what Mr. Clarence Wolf, of Quality Limestone Co., has to say about these two No. 3 *Pulverators* installed there more than two years ago. "Only maintenance we've had has been hammers and grate bars."

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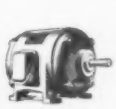
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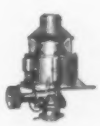
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Nine (9) Telsmith-BG Conveyors: 30" to 18" wide and 266' to 45' long

Barbers Corners Crushed Rock, Washed Sand and Gravel Plant of the Elmhurst-Chicago Stone Co., Elmhurst, Illinois. (Top) one of several Telsmith Vibro-King Screens; (left) Telsmith Scalping Screen, Gyratory and Gyrasphere Crushers.

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★ ★ Editor's Page

Agstone Associations Approaching a Merger

RECENT ACTION TAKEN by the boards of directors of both the Agricultural Limestone Institute and the National Agricultural Limestone Association hold out strong hopes that the agricultural limestone industry may soon be represented by a single national association. The memberships apparently have expressed a sincere desire to join forces for the welfare of the industry, and it is timely that they do. Consolidation can be promoted by obtaining and holding the largest possible membership in both associations.

It is remarkable that two separate and competitive national associations could exist so long in one industry. The reason is that the two associations have each given sufficient recognition to industry problems to make it worthwhile for their members to continue paying their dues.

Any association would be weak if it did not concentrate its efforts on the industry problems of utmost concern, and we have observed that both of the existing organizations have separately adopted programs of activities that are becoming more or less similar in pattern.

There has been a steady evolution to the activities of one group paralleling the efforts of the other and the only real difference, as far as industry members are concerned, is in the matter of emphasis by activity. There isn't much of a spread in thinking there either and, even if there was, that certainly would be no objection to a merger. Whether the main emphasis be on promoting government participation in providing funds for soil conservation or be in sales promotion directed to farmers, more effort in both fields is essential.

Similar Objectives

When the two associations were formed some seven years ago, each had a different planned course of action to further the interests of its members. Leaders of the N.A.L.A. believed that its principal effort should be directed toward attainment of substantial soil conservation appropriations from the federal government. Much of its effort has been, and continues to be, in that direction.

It is considered as essential that that work continue but it is being recognized also by the directors of N.A.L.A. that government appropriations cannot be depended upon indefinitely for security and that other steps must be taken to build markets for its members. The association now has an active sales promotion program and publishes a great amount of sales literature among other varied activities.

At the time the A.L.I. was started, as an affiliate of the National Crushed Stone Association, sales promotion and the publication of scientific information and other sales literature were to dominate its program. Shortly after its beginning, the A.L.I. has been increasing recognition to the need for an adequate soil conservation program and now devotes much of its effort in Washington to that purpose.

Principal programs of activities as set forth when the two associations were formed, while they may have differed sharply, have both been essential. Each is doing what it set out to do and is adding more of what the other stressed. If it was otherwise, one of them would have failed because it did not serve the best interests of its members.

The important point is that there is a great need for increased sales promotion to break down sales resistance of the farmer and it is very obvious that a great deal of other educational work is necessary. The public has yet to be sold on the need for liming and, until that is done, government endorsement and funds for adequate soil conservation programs will be difficult to secure and maintain.

Need for Strength

Agronomists have proven the essentiality of liming for sound agriculture and they have shown that present tonnages are far short of the national need. One strong national association of producers can, through expanded effort, effectively take *whatever* steps are needed to achieve the goals which the experts say we must reach.

Sincere desires to merge, as expressed by both sides, should not be side-tracked because of any technicalities. Both have agreed to merge and to consolidate the organization staffs for most effective representation. It is believed that A.L.I. wants the new organization to be affiliated with the National Crushed Stone Association. That could be worked out, without any dominance of the new association by the N.C.S.A., through an exchange of non-voting directors. There is no reason why an arrangement cannot be made whereby agstone producers will support the N.C.S.A. expositions or why national conventions cannot be held by the new association in Washington as N.A.L.A. prefers. The main thing is that the welfare of the industry must be served and now is the time to follow through.

Bror Nordberg

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Eagle Washers rule out "wash day blues" at the plant of Karl Hehl, Adams City, Colo. An Eagle double screw coarse material washer loosens and soaks pit-run material, washes it and delivers it dewatered to a vibrating screen. An Eagle double screw fine material washer, with adjustable long weir, washes, classifies and dehydrates sand which passes through the screen. A simple, economical, compact plant providing a range of readily marketed materials. Iowa Mfg. Co. designed the plant and made the "Cedarapids" conveyor, bins and screen. End "wash day blues" at your aggregate plant—send for Catalog 47.

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Rocky's NOTES

Nathan C. Rockwood

Confused Chemistry of Portland Cement

TWO FAIRLY RECENT PUBLICATIONS of the Portland Cement Association are needed to understand the limitations of ordinary inorganic chemistry in providing satisfactory explanations for the behavior of portland cement concrete. Both are digest summaries by Harold H. Steinour, of the P.C.A. staff of scientists; Bulletin 18 is entitled "The System CaO-SiO_2-H_2O and the Hydration of Calcium Silicates," and Bulletin 34 is entitled "Aqueous Cementitious Systems Containing Lime and Alumina."

The opening paragraph of Bulletin 18 gives an excellent picture of "progress" in portland cement research. To quote: "Many investigations of the system CaO-SiO_2-H_2O have been made at ordinary temperatures (15-30 deg. C.), particularly during the last twenty years. However, the nature and disconcerting variety of results make interpretation uncertain."

Mr. Steinour has done all interested in cement and concrete progress an excellent service in bringing out so complete a digest of scientific literature, much of it still available only in foreign languages, and therefore not accessible to ordinary readers. Also, although not by design, unless this is well concealed, he has shown of how little practical value is a great deal of these years of research. Much of that research has been done with very dilute solutions, or collodial suspensions if that eventually proves to be the case, and therefore is probably of academic interest only. Whether water enters into chemical combination with the lime and silica or not, the amount present appears to have very important physical results.

Some Salient Points

The following points are taken from the author's summary and conclusions: (1) "The solid products (of the system CaO-SiO_2-H_2O) are ordinarily collodial, and where a few lines have been obtained in an X-ray spectrum, they are the same for products of varied CaO/SiO_2 molar ratios." That is to say, so far as crystallography can show, the alleged dicalcium and various other *hydrous* calcium silicates do not actually exist. (2) "Since the solid products are colloidal, it is to be recognized that only colloidal equilibrium is attained in any case. Differences in adsorptivity and in solubility, as a result of differences in particle size, may therefore be important." From these statements we believe a case for at least some percentage of relatively coarse cement particles could be drawn. Nobody, so far as we know, has explored the possibility that relatively coarse, perhaps always unhydrated particles, may be the nuclei about which the unstable colloid or gel products can be made to crystallize.

The part that the *amount* of water plays in the physical properties of hardened cement and concrete is of course well known from both experiment and experience. To our mind, as stated in the May issue of ROCK PRODUCTS, the amount and disposition of this water content are probably keys by which many of the present mysteries of concrete failures will be solved. Mr. Steinour says: "The amount of water held by the hydrous calcium silicates under varied circumstances has been less investigated than the relative amounts of CaO and SiO_2. * * * * In compositions approaching $CaO.SiO_2.aq.$ [an hydrated monocalcium silicate] the first molecule of water appears to be rather firmly held and may be constitutional." That is to say, at least one part of the water *may be* in actual chemical combination in the alleged silicate. However, modern understanding of colloid chemistry leads to belief that water which is still water (not water of crystallization, or chemically combined water) may be almost equally firmly held in the minute pores and capillaries of any amorphous mineral.

Effect of Alumina

In Bulletin 34, Mr. Steinour has extended his digest to include literature of portland cement research other than that relating only to its most important ingredient, $CaO.SiO_2.aq.$, which ordinarily constitutes 75 percent of the product. The introduction of alumina complicates the ordinary chemistry of hydrated cements. The alumina (as well as iron oxide) is helpful in calcining raw mixtures to make clinker because it reduces the melting or fluxing temperatures now deemed necessary. As an ingredient of clinker and of the hydrated cement, the alumina appears to be the cause of many concrete troubles.

It would be possible to make a portland cement clinker almost entirely free of alumina either by use of some other fluxing agent, or by some hydrothermal process, such as in sand-lime brick manufacture, and subsequently sintering the hydrous product. Pulverized silica and lime are readily combined by superheated steam, and the combined, or possibly adsorbed, water could be subsequently driven off by sintering the material, probably with less expenditure of heat energy than in present wet-process cement manufacture. However, it is better to learn the possible value of alumina in portland cement, and find a way to utilize known good properties. Since there is ample proof of durable minerals in Nature composed essentially of silica, alumina and calcium, there should be a possibility of artificially combining and processing them to advantage.

Returning to Steinour's Bulletin 34, one of his conclusions is: "When the anhydrous calcium aluminates are made up with limited amounts of water, as in pastes comparable to practical cement pastes, visible crystal formation is not pronounced and gelatinous products tend to dominate." This statement is necessary because a great deal of experimenting done with very dilute solutions (or it may be colloidal suspensions?) have caused experimenters to decide that crystals containing lime and alumina were readily formed, while the lime and silica products were always gels.

Another conclusion of Mr. Steinour is: "No direct evidence has yet been produced for the formation, during the reaction of portland cement and water at room temperature, of a calcium-silico-aluminate." Since concrete makers are trying to produce an artificial rock, this failure to make a calcium-silico-aluminate is unfortunate, because Nature's products of this kind are common and usually durable. Most of Nature's rock products also contain one or more of the alkalies and frequently magnesium. It is quite possible that the alkalies, which there is now a tendency to ban from all portland cements, may eventually be found important to better cement.

Mr. Steinour's parting statement in Bulletin 34: "A definite need exists for new techniques in the investigation of the cement-water system." A great many users of portland cement will hail that conclusion, if it means a changing attitude in the P.C.A., toward cement and concrete research. When one reviews the vast volume and the discordant results of the research of the last half century, it is easy to understand how a scientific staff of a cement manufacturers' association could become diverted and assume necessarily a defensive attitude.

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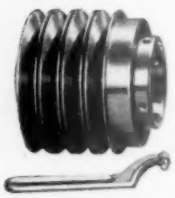

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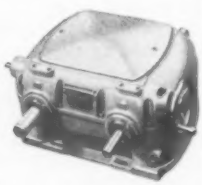

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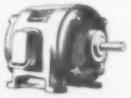

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LABOR RELATIONS TRENDS

Picket Lines No Longer Sacred

By NATHAN C. ROCKWOOD

A RECENT DECISION of the U. S. Court of Appeals, Seventh Circuit, Chicago, Ill., unless reversed by a subsequent decision of the U. S. Supreme Court, which does not seem likely, has put a serious crimp in the time-honored "right" of union members to refuse to cross picket lines established by another union that does not represent them, and in whose quarrel they have only an indirect interest. This decision, although in an entirely different kind of an industry, is of special interest to these rock products industries, because recent refusals of the National Labor Relations Board to consider numerous labor controversies of local building trades has largely nullified any relief these industries may have expected from the secondary boycott provisions of the Taft-Hartley Act.

The decision restores to employers the right to discipline employes who "as a matter of principle" refuse to cross the picket lines of a union on strike, even when the strikers are with the same employer. The strike sympathizers can at least be demoted by the employer, and he can promote others to take their places. This particular case has been in controversy since 1947 and involved only interpretation of the National Labor Relations Act before amendment by the Labor Management Relations Act (Taft-Hartley). Nevertheless, the same judicial reasoning would apply to the amended law. Specifically, the case involved the demotion of a group of eight telephone supervisor girls employed by the Illinois Bell Telephone Co. in Chicago.

Facts in Point

Pertinent extracts from the Court's decision, refusing to enter an order petitioned for by the National Labor Relations Board, follow. The Board had requested the Court to sustain its order to reinstate the employes in their supervisory jobs and pay them the wages they had lost. The Board had ruled "that such employes were engaged in a concerted activity protected by paragraph 7 of the N.L.R.A. and that the respondent's [company's] action violated paragraph 8 (1) of the Act and 'because such a demotion amounts to a discrimination in hire and tenure of employment and thereby discourages membership in the labor organization; it also violates Section 8 (a) (3) of the Act.'"

There was an economic strike by employes of the company outside of the city of Chicago, by members of another but affiliated union. The local union, of which the eight girl supervisors were members, was not on strike and had no current quarrel with its employer. The outside union, however, threw picket lines about the Chicago exchanges, with the intent, of course, of persuading members of the local union not to continue work. The eight employes refused to cross these picket lines. They all testified to the same effect that they would not cross picket lines as a matter of principle. The company management thereupon wrote letters to these employes to the effect that their jobs would be in jeopardy by a continued absence from work, that they were being demoted from supervisors to operators, and that their employment would be suspended as of the first day they failed to report for work under their new assignment. They did not report until some time later when the strike had been settled and the picket line removed.

Board Orders Reinstatement

The text of the Court's decision at this point reads: "It was the demotion of these eight employes by respondent which the Board found to be a violation of §§8 (1) and 8 (3) of the Act. On this premise the Board's order requires respondent to cease and desist from discouraging membership in Illinois Traffic Division, 14 C.W.A. (successor of I.T.T.U.) or any other labor organization of its employes, by discriminating in their employment and in any like or related manner from coercing its employes of the right guaranteed by §7 of the Act. And respondent was required to offer the eight employes reinstatement to their former positions as telephone supervisors, to make them whole for any loss in wages, pension rights or sick benefits which they suffered as a result of their demotions, and to post appropriate notices.

"The crucial issue, as we view the situation, is whether the eight employes were protected by §7 of the Act. If so, the finding of an unfair labor practice and the order resulting therefrom is sustainable; otherwise, not. That section provides (29 U.S.C.A. §157):

"Employes shall have the right to self-organization, to form, join, or assist labor organizations, to bargain collectively through representatives of their own choosing, and to engage in concerted activities, for the purpose of collective bargaining or other mutual aid or protection.

Meaning of "Strike"

"It is the Board's theory that the eight employes were engaged in 'concerted activities' for their 'mutual aid or protection.' The Board terms the activities of the eight employes a 'strike,' while respondent labels it as a 'wildcat strike.' In our view, it was not a strike in any ordinary connotation of that term. This court * * * * accepted the definition of a strike as contained in American and English Encyclopedia of Law, volume 24, page 123, as follows:

"The term 'strike' is applied commonly to a combined effort on the part of a body of workmen employed by the same master to enforce a demand for higher wages, shorter hours, or some other concession, by stopping work in a body at a pre-arranged time, and refusing to resume work until the demanded concession shall have been granted.

"While the Labor Management Relations Act of 1947 is inapplicable because the events in controversy took place prior to its enactment, it is interesting to note that §142 provides:

"The term 'strike' includes any strike or other concerted stoppage of work by employes * * * and any concerted slow-down or other concerted interruption of operations by employes.

Concerted Activities

"There is no evidence that these eight employes acted in combination or concert. They did not converse with each other or any other person regarding the activity in which they engaged, that is, a refusal to cross the picket line. The record discloses unmistakably that each acted in her own individual capacity. The Board in its brief states, 'Their only concern was to help the I.T.T.U.' Even that concession is the result only of a dubious inference. None of the involved employes testified to any such concern. Their testimony discloses that their refusal to cross the picket line was a matter of principle, and that it would have made no difference whether the picket line was maintained by I.T.T.U. or some other union. The Board in its brief states that these employes 'had no grievance which could have been adjusted through grievance procedures. The object behind their refusal to cross the picket line was merely to support the grievance of others.' And at another point the Board states, 'Here, there was no controversy between respondent and the C.T.T.U.; the complainants merely refused to cross the I.T.T.U. picket lines to support the demands of the I.T.T.U. rather than their own grievances.'

"Assuming, however, contrary to what we think, that the involved employes engaged in 'concerted activities,' we are unable to discern from this record, and particularly in view of the concessions made by the Board, how it can be held that such activities were for their 'mutual aid or protection.' They neither sought nor were entitled to seek on their own behalf

(Continued on page 92)

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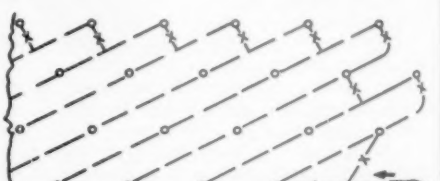

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the *Personal Side* of the news

Secretary Retires

EDGAR F. SHEPPARD has retired as secretary and treasurer of the Lawrence Portland Cement Co., New York, N. Y., after 55 years of service with the company. Albert H. Schaefer has been elected to succeed him as secretary and John K. Gilley as treasurer. Fred G. Meissner has been appointed assistant secretary and treasurer.

Named Vice-Presidents

BEN A. BROLLIER has been appointed vice-president in charge of credits for Black-Brollier, Inc., Houston, Texas, and W. F. Smith, formerly sales promotion manager, has been named vice-president in charge of sales and advertising.

Sales Manager

JAMES G. MOERDER has been promoted to the position of sales manager of the plaster division of the Three Forks, Mont., division of Ideal Cement Co., Denver, Colo., with headquarters at Butte, and Albert G. Stubblefield has been appointed assistant sales manager.

Ordnance Plant Managers

COLON BROWN, manager of the Mobile, Ala., insulation board plant of the National Gypsum Co., Buffalo, N. Y., has been appointed head of the bomb and shell loading plant at the Kansas Ordnance Plant, Parsons, Kan., which the company is operating for the government. Assisting him as production manager will be Frank C. Crowley, for seven years manager at the Portsmouth, N. H., gypsum plant. Mr. Brown is being succeeded at Mobile by George Cook, formerly assistant manager and production superintendent. Mr. Crowley's successor is Albert C. Olsen, formerly mill superintendent at the Savannah, Ga., plant.

George Cook

Keith W. Waugh, who has been manager of the National City, Mich., gypsum plant, has been placed in charge of operations at the Nebraska Ordnance Plant, Wahoo, Neb., which the company is also operating for the government. Robert E. Scifres, who was an electrical engineer in the Bluebonnet plant during World War II, succeeds Mr. Waugh as manager at National City.

Mr. Brown has been with the Mobile plant since 1938, as office manager, assistant works manager and plant manager. He was born in Mississippi and educated at the University of Mississippi and the University of Indiana.

Albert C. Olsen

Mr. Crowley worked at the Bluebonnet Ordnance Plant during World War II and then was transferred to the Portsmouth plant where he became manager. He has been with the company since 1936.

Mr. Waugh, a graduate of Lafayette College, has been with National Gypsum Co. since 1939, as plant manager at Saltville, Va., director of production at Bluebonnet, plant manager at Bellefonte, Penn., and manager at the National City plant.

Mr. Cook was assistant works manager and production superintendent at the Mobile plant before becoming manager.

Mr. Olsen has been with the company for 14 years, as quality supervisor, line foreman in the board plant, and mill superintendent at the Savannah, Ga., plant. He was born in Illinois and educated in New York and at the University of Michigan.

Robert E. Scifres

Mr. Scifres was an electrical engineer in the Bluebonnet plant during World War II. Since then he has been plant engineer, assistant to the plant manager, and assistant board plant superintendent at the Mobile plant. Born and educated in Indiana, he received an M.S. degree in business and engineering administration from M.I.T. in 1950, when he was assigned to the New York plant.

Sales Manager

ROY POWELL has been appointed sales manager of Anchor Concrete Products, Inc., Buffalo, N. Y., according to an announcement by Frederick W. Reinhold, president.

Development Engineer

ELMER J. BOER, Columbus, Ohio, has joined the staff of Bituminous Coal Research, Inc., Pittsburgh, Penn., as development engineer. He has been with Battelle Memorial Institute since 1945.

Sales Representative

RAYMOND J. SALSCHEIDER has been appointed sales representative in the southern Minnesota and western Wisconsin territory of the Dewey Portland Cement Co., Kansas City, Mo. Mr. Salscheider is a graduate of the University of Minnesota where he studied mechanical and aeronautical engineering.

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President Retires

C. EUGENE IRELAND, chairman of the board of Birmingham Slag Co., Birmingham, Ala., has retired as

C. Eugene Ireland

president of the company, but will continue as chairman. He has been president since 1929. Charles W. Ireland, executive vice-president, has been named to succeed him. C. A. Barinowski has been re-elected vice-president in charge of sales; J. W. Johnston, vice-president in charge of operations; and N. L. Smith, secretary and treasurer. Appointed to serve on a newly formed directors executive committee are Charles W. Ireland, president; William Comer Ireland, vice-president in charge of subsidiary operations; and William Reynolds Ireland, president of the Atlanta Aggregate Co.

Charles W. Ireland

Marquette Appointment

PAUL DUNCAN has been appointed assistant secretary and treasurer of Marquette Cement Manufacturing Co., Chicago, Ill., in addition to his duties as head of the accounting department. With the exception of a two-year period spent in the U. S. Army during World War II, Mr. Duncan has been with the company continuously since 1933, following his graduation from the University of Notre Dame with a degree in commercial science. He started as a member of the repair crew at the Oglesby, Ill., plant and worked his way up until he was appointed comptroller and head of the accounting department in 1947.

Sewell Avery Resigns

SEWELL L. AVERY has resigned as chairman of the board of United States Gypsum Co., Chicago, Ill., and C. H. Shaver, vice-president and treasurer, has been named to succeed him. Mr. Shaver will continue as treasurer. Oliver M. Knode has been re-elected president. Mr. Avery, an executive of the company since its organization in 1901, became president in 1905 and chairman in 1937.

Enjoys Youth Work

FRANK P. SPRATLEN, JR., owner of the Ready Mixed Concrete Co., and Spratlen Materials, Inc., Denver, Colo., gets his greatest enjoyment from his work in behalf of youth. He has served for many years on the boys work committee of the Rotary Club, has been secretary and manager of two teams in the Young America Football League, has been on the board of directors of Big Brothers, Inc., and helped organize Denver Boys, Inc. Born in Denver in 1897, Mr. Spratlen attended public schools there and entered the University of Colorado in 1916. He had intended to study medicine but was interrupted by World War I. He was a member of the Reserve Officers' Training Corps at U.C. and received a commission as first lieutenant in the Army. He attended an officers training camp at the Presidio in San Francisco, and then was assigned the job of giving entrance examinations for West Point in the Pacific Coast states. Discharged from the Army in 1919, he joined H. W. Moore & Co., a road construction equipment firm, as a salesman in 1920 and worked up to the job of assistant general sales manager within a year. He left there in 1921 to become a junior partner of his father-in-law, J. W. Brannan, in the J. W. Brannan Sand and Gravel Co. He became president of the company in 1930, upon the death of Mr. Brannan and later, in partnership with his brother-in-law, Lloyd Brannan, reorganized the firm into Spratlen-Brannan, Inc. In 1936 they organized the Ready Mixed Concrete Co. He acquired Mr. Brannan's interest in the business in 1943, in which his two sons, Frank P. III and John, now hold executive positions.

Mr. Spratlen is a member of the National Sand and Gravel Association and the American Concrete Institute, and is a past-president of the National Ready Mixed Concrete Association. During the early days of the late President Franklin D. Roosevelt's administration, he was a member of the regional National Recovery Administration Code Authority for the sand and gravel, crushed stone and slag industries, and in World War II he was a regional member of the War Labor Board.

Frank P. Spratlen, Jr.

Association Officials

EARL C. FAULKNER, general sales manager of the United States Gypsum Co., Chicago, Ill., has been elected first vice-president of the Gypsum Association, Chicago. James Bale, general manager of Grand Rapids Plaster Co., Grand Rapids, Mich., has been re-elected treasurer for a third term.

Lone Star Director

J. R. ROVENSKY, chairman of the board of Patino Mines and Consolidated Enterprises, Inc., has been elected a director of the Lone Star Cement Corp., New York, N. Y.

Joins A.E.C.

HOWARD R. STALEY, associate professor of building construction at the Massachusetts Institute of Technology, has joined the U. S. Atomic Energy Commission, Silver Spring, Md., as construction engineer. Prof. Staley, who has done considerable research work on lime, is a member of Committee C-7 on Lime of the American Society for Testing Materials.

Calaveras Appointments

WILLIAM WALLACE MEIN, founder of the Calaveras Cement Co., San Francisco, Calif., and its president for more than 25 years, has been named to the newly-created post of chairman of the board. William Wallace Mein, Jr., formerly vice-president and assistant to the president, has been elected president of the company. H. C. Maginn, a vice-president and chairman of the management committee, has been named executive vice-president, and A. A. Hoffman, consulting engineer, has been appointed vice-president. Other officers have been re-elected.

Heads Research Section

GEORGE J. VERBECK, formerly a senior research chemist of the research and development division of the Portland Cement Association, Chicago, Ill., has been appointed manager of the applied research section of the division, with headquarters at the laboratories in Skokie, Ill. He replaces William Lerch, who was recently promoted to the position of administrative assistant. Mr. Verbeck is a graduate of Lawrence College, where he majored in chemistry. He received his Master's degree in physical chemistry from the University of Chicago in 1940. Prior to joining the Association in 1941 as assistant chemist, Mr. Verbeck served for a time with Abbott Laboratories. During the war he was employed by the Institute of Gas Technology and Koppers Co., Inc., butadiene division. He returned to the Portland Cement Association in 1945 as associate research chemist and was later appointed research chemist and senior research chemist. Mr. Verbeck is a member of the American Chemical Society and the American Concrete Institute.

Appointed to N.P.A.

BURTON A. FORD, vice-president of St. Regis Sales Corp., Allentown, Penn., has been appointed chief of the Paper Shipping Section of the Container Division of N.P.A., with offices in the Old General Accounting Office Building, Washington, D. C.

Elected President

R. NEWTON MCDOWELL, president of the McDowell Stone Co., Kansas City, Mo., is now also president of the Granite City Slag Co., Granite City, Ill., and the Gary Slag Corp., Gary, Ind., with sales office at 542 S. Dearborn St., Chicago, Ill.

Research Engineer

JOHN M. GRIFFITH has been appointed engineer of research for The Asphalt Institute, New York, N. Y. He succeeds Prevost Hubbard, who has retired. For the past eight years Mr. Griffith has been with the flexible pavement branch of the Waterways Experiment Station at Vicksburg, Miss., which is a research branch of the U. S. Corps of Engineers operating under the chief of engineers, Department of the Army.

John M. Griffith

Elected President

C. RAY WILHELM, manager of the Atlanta, Ga., plant of the Universal Concrete Pipe Co., Columbus, Ohio, has been elected president of the Georgia Concrete Pipe Association.

OBITUARIES

CARLTON S. WICKER, sales manager of Buffalo Slag Co., Inc., Buffalo, N. Y., died May 17, after an illness of about a year. He was 60 years of age. Born in Geneseo, N. Y., Mr. Wicker attended Dartmouth College. He became associated with Buffalo Slag Co. in 1919 as sales engineer and later was promoted to sales manager. He was a pioneer in the Buffalo area in the introduction of slag in concrete for construction purposes and was well known in construction and engineering circles. Mr. Wicker was a member of the American Concrete Institute, American Society for Testing Materials, Society of American Military Engineers, American Railway Engineering Association, American Society of Civil Engineers, and was on the Problems Committee of the National Slag Association.

ROY W. CRUM, director of the Highway Research Board of the National Academy of Science, Washington, D. C., died May 13 after a brief illness. He was 66 years old. Mr. Crum, a former engineer for the Iowa State Highway Commission, had been head of the research board since 1928.

EDMUND SEWALL SIMPSON, president of the Super Concrete Co., Washington, D. C., died in Washington on April 10. Mr. Simpson had been president of the company since 1929, when he moved to Washington from Virginia. Born in Fort Wayne, Ind., he lived for many years in Richmond, Va., as an employe of the Chesapeake & Potomac Railroad and later as president of the West Virginia Coal Co. Mr. Simpson had for many years been actively interested in affairs of the National Ready Mixed Concrete Association.

PAUL C. VAN ZANDT, retired vice-president of the Universal Atlas Cement Co., Chicago, Ill., died May 26 at his home in River Forest, Ill. He was 73 years of age. A mechanical engineering graduate of Purdue University, Mr. Van Zandt was associated with Allis-Chalmers Manufacturing Co., Milwaukee, Wis., for many years before World War I, and traveled widely for the company in Europe and the Orient. In 1918 he became chief engineer of the Asano Cement Co., Tokyo, Japan, and remained there until 1923. He was credited with being one of the founders of Japan's cement industry, and helped construct cement plants in many parts of the Orient. Upon his return he was appointed chief engineer of Ideal Cement Co., Denver, Colo., and in 1931 became vice-president of Universal Atlas Cement Co., from which position he retired in 1945.

STEPHEN FLAM, concrete machinery manufacturer, died recently in Los Angeles, Calif. He was 66 years old.

JOHN J. MERRILL, president of the Alfred-Atlas Gravel and Sand Corp., Alfred, N. Y., died April 19 in Hornell, N. Y., after a long illness. He was 89 years of age. Mr. Merrill was a member of the New York State Tax Commission from 1917 to 1939. He went to western New York as a student at Alfred University, from which he was graduated in 1884.

JAMES LEENHOUTS, treasurer and general manager of Grand Rapids Plaster Co., Grand Rapids, Mich., died May 25. He was 80 years old. Born on a farm two miles northeast of Zeeland, Mich., a town founded by his grandfather, Mr. Leenhouts joined the plaster company in 1890. He became a member of the board of directors in 1901 and later was named treasurer and general manager. Mr. Leenhouts was one of the founders of the Gypsum Association in 1910, serving as president for nine years. He was honored by the association last August for his services to the association and for his contributions to the gypsum industry in general.

RICHARD S. YANT, president of the Omaha Concrete Products Co., Omaha, Neb., died suddenly at his home on April 27. He was 38 years old.

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TEXACO

TEXACO Lubricants and Fuels

INDUSTRY *news*

Marquette Cement Manufacturing Co.'s Nashville, Tenn., plant was winner of the recent inter-plant bowling championship trophy sponsored by the company. Left, D. S. Colburn, vice-president, presents award to team captain, Jesse King. Others wearing victory grins are (left to right) Cecil Moore, Gene Smith, Creighton Miller (plant superintendent), William Cunningham and Leland Davis

Lime Publication

NATIONAL LIME ASSOCIATION, Washington, D. C., recently announced publication of an outstanding booklet, "Chemical Lime Facts," in which the many uses of lime are briefly described and outlined. In addition, there is a technical data section which presents a consolidation of fundamental facts and data on the physical and chemical characteristics of lime.

The 42-page booklet is divided into two chapters. Chapter I, "Chemical Uses of Lime," describes the application of lime in chemicals; metallurgy; pulp and paper; water treatment; sewage-trade wastes treatment; ceramic products; building materials; protective coatings; food and food by-products. Chapter II, "Chemical and Physical Properties of Lime," is a compilation of technical facts and data, which includes many graphs, charts and tables.

A.C.P. Appropriations

THE HOUSE OF REPRESENTATIVES recently defeated a motion to increase the authorization for the 1952 Agricultural Conservation Program to $285,000,000. Likewise, it defeated another motion to decrease the authorization to $150,000,000. This leaves the sum authorized for next year's program at $225,000,000, the figure recommended by the Subcommittee on Agricultural Appropriations. No action was taken to change the appropriation of $256,500,000 recommended by the committee to pay for the 1951 program.

The total direct annual appropriation of $820,000,000 requested by the President for the operation of the U. S. Department of Agriculture has been cut by the Subcommittee on Agricultural Appropriations to a little over $720,000,000, a reduction of approximately 12 percent. Nearly every item in the bill was decreased to some extent.

Texas Mineral Resources

A 6-MONTH SURVEY by the Southwest Research Institute revealed the existence of substantial quantities of kaolin, plastic clays, talc and feldspar in the San Antonio, Texas, area.

Talc of commercial grade was reported as occurring in Gillespie and Blanco counties. The feldspar found in Llano county, according to the institute's laboratory experiments and chemical analysis, is also reported to be of good quality and has been successfully used in the production of glass and glazes. Dolomite and limestone were also reported to be found in substantial quantities in this area.

Slag Production

IRON BLAST-FURNACE SLAG production in 1950 reached a new high. Output totaled 24,926,033 short tons, valued at $29,480,858, as reported to the Bureau of Mines. The statistics were based on a canvass conducted by the National Slag Association of the 42 companies operating 63 plants for processing air-cooled slag, and 12 companies operating 17 plants for expanding slag.

Screened air-cooled slag reached a new total of 20,047,844 short tons, an increase of 13 percent over the 1949 figure. Of this total, 17,908,480 short tons, or 89 percent, was used as railroad ballast, as aggregate in portland cement concrete, bituminous construction of all types and miscellaneous highway construction uses. Other uses accounting for the balance were in mineral wool, concrete block, agriculture, as a sewage trickling filter medium, slag roofing and miscellaneous.

Unscreened air-cooled slag output totaled 1,005,436 short tons, valued at $639,499. This material was utilized in highway construction (other than in portland cement concrete and bituminous construction), railroad ballast and other uses.

Output of granulated and expanded slag showed substantial increases over 1949 figures, totaling 2,168,365 and 1,704,388 short tons, respectively. As in past years, about half of the granulated slag was used in the manufacture of hydraulic cement. Nearly the entire output of expanded slag was used as aggregate in the production of concrete block.

Iron blast-furnace slag is produced in many states, but most of the material is processed in the steel centers of Ohio, Pennsylvania, Alabama and Illinois. As in 1949, Ohio was the largest producer of air-cooled slag. The recovery of iron by processors during 1950 amounted to 296,603 short tons, an increase of 4 percent over the figure for the previous year.

Almost the entire output of iron blast-furnace slag was shipped by rail and truck—47 percent by railway, 51 percent by truck and 2 percent by waterway. A total of 5,399,500 man-hours were expended by 2015 plant and yard employes (excluding administrative and sales personnel) in the production of commercial slag during 1950. This was a slight increase in the number of man-hours utilized and a decrease in the number of plant and yard employes.

STANFORD RESEARCH INSTITUTE LIBRARY

Cement Plant Expansion

SOUTHERN STATES PORTLAND CEMENT CO., Rockmart, Ga., recently announced plans for expansion and modernization of its plant facilities, at a cost of between $4,000,000 and $5,000,000. Approximately 900 acres of land are owned by the company on which are located large deposits of limestone, shale, silica and iron ore. It is said to be the only company in the country with so many raw materials right at the center of manufacturer.

The company, organized in 1902 by Hugh F. VanDeventer, has an annual production rate of 850,000 bbl. of cement, of which 100,000 bbl. are masonry cement. W. B. Elcock is president of the company.

Air-Pollution Indicator

BATLELLE MEMORIAL INSTITUTE, Columbus, Ohio, recently announced the development of a new instrument for use in analyzing air-pollution problems in highly industrialized areas. Known as a "directional dirt-fall collector," the instrument is claimed to be capable of providing an index of the general location of plants which may be responsible for heavy dirt fall.

For a reliable indication of the sources of heavy contamination, the instrument may be exposed for 30-day collection periods over many months in a carefully chosen location representative of a given area. The amounts of collected material, as explained by the institute, must be correlated with data obtained from the Weather Bureau. A so-called "windrose pattern" shows the number of hours the wind has blown from the eight points of the compass. It is then possible to determine the relative amounts of dirt which have fallen per hour into the instrument from the various directions. Simultaneously, fine particles and gas and odor concentrations in the air, along with weather conditions, may be analyzed using other appropriate equipment.

Mica Exempted from Price Control

SALES OF RAW MICA and mica parts to federal agencies, from foreign sources, have been exempted from price control by the Office of Price Stabilization, as was recently reported in the New York *Journal of Commerce*.

The price situation in mica became critical almost immediately after the outbreak of the Korean war. Foreign suppliers have been raising their prices steadily, or shipping inferior material against contracts made at lower prices. Prices have risen from 35 percent up to 100 percent for the scarcer high grades of mica. Domestic production can supply only a fraction of our needs and much of the domestic material is unsuitable for critical electronic and electrical uses. Mica has been on the top of the list for stockpiling since the beginning of World War II, but the mica reserve is still below a level safe enough to carry the country through another major conflict if foreign sources are cut off. Private mica importers and fabricators have been forced to bid up their prices to maintain their share of supplies. The price freeze made it virtually impossible to continue doing business because their raw material costs were exceeding, in many cases, the prices they could charge for fabricated mica components.

The bulk of mica consumption in this country is composed of mica splittings, most of which comes from India. Other leading sources are Brazil, Argentina and South Africa. The action by O.P.S. is contained in General Overriding Regulation 9, effective May 1, 1951.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 18,708,000 bbl. of finished cement in March, 1951, as reported to the Bureau of Mines. This was an increase of 31 percent compared with the output in March, 1950. Mill shipments totaled 17,692,000 bbl., an increase of 21 percent over the March, 1950, figure, while stocks were 0.3 percent below the total for the same month in 1950. Clinker production during March, 1951, amounted to 19,750,000 bbl., an increase of 25 percent compared with the corresponding month of the previous year. The output of finished cement during March, 1951, came from 150 plants, located in 36 states and Puerto Rico. During the same month of the previous year, 14,301,000 bbl. were produced in 148 plants.

Plant Under Construction

W. R. BONSAL & CO. is building a new sand and gravel plant near Cheraw, S. C. Cheraw is about 30 miles south of Lilesville, N. C., where is located the company's older gravel plant, its Flexicore operation and Sakrete plant. The new gravel plant is near Cash, adjacent to U. S. Highway 1 and about 87 miles northeast of Columbia, S. C., the capital of the state of South Carolina.

The gravels in the Lilesville-Cheraw district appear to have the common characteristic of being small in size and to be made up largely of almost pure white silica pebbles. The amount of overburden is also relatively large, so dragline stripping operations are extensive. The surface of the area is typical South Carolina farmland with little evidence showing on the surface that gravel lies below. Hence, before building a new plant, exploratory or prospecting work has to be carried out over wide areas.

OPS Guide

THE OFFICE OF PRICE STABILIZATION recently issued the "OPS Guide" which explains what is expected of manufacturers affected by Ceiling Price Regulation 22. Copies may be obtained by requesting bulletin OPS 63 from OPS in Washington.

Installs Kiln

IDAHO PORTLAND CEMENT CO., Spokane, Wash., is installing a new $150,000 kiln at its plant in Inkom, Ida., which is expected to increase plant capacity to 2700 bbl. of cement per day. Present capacity is 1200 bbl. Part of the expansion program also calls for the construction of two mills to supply raw materials for the new kiln.

Phosphate Production

FLORIDA PHOSPHATE DIVISION, International Minerals and Chemical Corp., has increased plant capacity by the addition of three new draglines at its phosphate mine near Tampa, Fla. It was stated that the company expects to add more draglines when they are available. With the expected additional equipment, Florida phosphate production will jump to 10,000,000 tons per year by 1955, according to company officials. Estimated tonnage for last year was 8,350,000, as against 6,695,407 tons mined in 1949. The entire national output for 1949 was 8,877,474 tons.

Silica Plant

HARBISON-WALKER REFRACTORIES CO., Pittsburgh, Penn., recently announced plans for the construction of a $3,500,000 silica plant at Downington, Penn. This plant will be in addition to the scheduled $22,000,000 expansion program already announced by the company, and will be a duplicate of the Windham, Ohio, plant the company expects to have completed about the end of 1951.

The Downington plant will be used to produce materials for lining industrial furnaces used in coke production. The plant site was selected because of its nearness to U. S. Steel Co.'s new Fairless plant and other nearby steel plants.

The company's new clay-brick unit at Bessemer, Ala., began operations in July, permitting capacity at that plant to be doubled. A new tunnel kiln, already in operation, has increased production at the Fulton, Mo., plant by 25 percent. The capacity of the magnesite plant at Cape May, N. J., has been doubled, as will production at Fairfield, Ala., by the end of 1951. Expansion which will add one-third to the present capacities at East Chicago, Ind., and Baltimore, Md., will be under way by the last quarter of this year.

Crushed Stone

McLELLAN STONE CO., Bowling Green, Ky., recently began construction of a new plant on Halifax road in Allen county, Ky. The plant will produce crushed stone and agricultural limestone. The company also operates plants in Bowling Green and Horse Cave, Ky. G. L. McLellan is president and Bill McLellan will be in charge of the Allen county plant.

Asbestos Products Plant

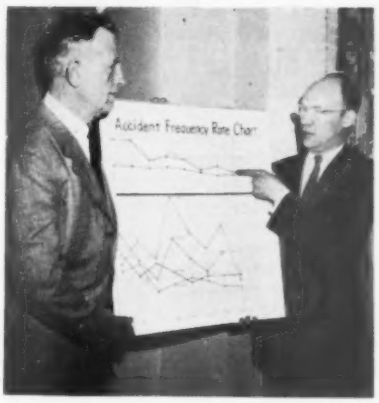
KEASBEY AND MATTISON CO., Ambler, Penn., has started construction of a $2,500,000 asbestos products plant at Santa Clara, Calif. The company will produce asbestos cement and building materials, with anticipated employment of 200 men. The company also operates plants at Ambler, Penn., St. Louis, Mo., and New Orleans, La. Ernest Muehleck is president. Most of the asbestos used by American industry is imported from Canada, but deposits have been developed recently in Calaveras, Placer, San Benito, Shasta and other California counties.

National Gypsum to Operate Ordnance Plants

NATIONAL GYPSUM CO., Buffalo, N. Y., has been awarded a contract to operate the $30,000,000 Nebraska Ordnance plant at Wahoo, Neb. Demolition bombs of various sizes will be made on the 17-acre site. Production is scheduled to begin by July 1. About 5000 persons will be employed at the plant. Keith W. Waugh, formerly manager of the company's plant at National City, Mich., has been named manager of the ordnance plant.

During World War II, National Gypsum operated a munitions plant at Bluebonnet, Texas, for the federal government. Late last year National Gypsum was asked to make a survey of the Wahoo plant to determine its needs for reactivation.

National Gypsum Co. has also been awarded a contract to operate the Kansas Ordnance plant, near Parsons, Kan. The Kansas Ordnance plant is producing artillery shells in a reactivation program begun several months ago. It was reported that National Gypsum will use about 2000 employes at the start of its operations. Army Ordnance now employs approximately 1600. Capacity employment at the plant would be about 6000, depending upon international conditions. Colon Brown, former manager of National Gypsum's Mobile, Ala., plant, will be general manager; other key personnel include Frederick A. Wagner, company auditor, controller; Frank D. Crowley, former manager of the Portsmouth, N. H., plant, production manager; Clarence B. Fox, of the Kimballton, Va., plant, assistant general manager; and Robert Meister, of the Arlington, Va., plant, director of operations.



M.C.M. Pollard, chairman of Gypsum Association's safety committee, demonstrates to L. H. Yeager, general manager, how the accident-frequency rate at all gypsum plants has been reduced over 50 percent in the last eight years, due to an intensive safety program conducted within the industry

New Agstone Specifications

A COMMITTEE, representing the Iowa Agricultural Limestone Association, recently met with representatives of the Iowa State P.M.A. Office and of Iowa State College, for a discussion on proposed changes in agricultural limestone specifications. The I.A.L.A. committee offered the following recommendations:

That the present minimum of 80 percent $CaCO_3$ equivalent and a minimum of 80 percent to pass an 8-mesh sieve, with the factor or multiple of .7200, be retained. (This would mean that one of these minima must actually be at least 90 percent in order to meet the multiple of .7200). It was also recommended that the present specification of 20 percent to pass a 100-mesh sieve be eliminated.

This recommendation was accepted by both the State P.M.A. Office and Iowa State College, but is subject to approval of the Department of Agriculture in Washington, D. C. In accepting this recommendation, the P.M.A. made it plain that it intended to rigidly enforce non-compliance with such a specification. The committee agreed that limestone producers would be willing to abide by such a specification, providing proper methods of taking samples for testing purposes were instigated. Representatives of the three groups were appointed to make a study of this problem.

Iowa State College suggested that an availability clause be inserted in the specification, contending that the value of liming materials to the farmer depends on the percentage that becomes quickly available to the farmer, at least within a 3-year period. It was felt such a provision would become very technical and difficult to administer. It was suggested that limestone producers start working on the availability question, using the method worked out by the college.

Gypsum Production

IN 1949 THE PRODUCTION of crude and calcined gypsum, imports of crude gypsum and sales by producers of most gypsum products lagged behind 1948, but they were still high, in most instances the second highest on record, as reported in the Bureau of Mines *Minerals Yearbook* for 1949. Production totals were reported as follows:

Crude mined	6,608,118 short tons
Calcined produced	5,767,163 short tons

Gypsum products (made from domestic, imported and by-product crude gypsum) sold or used in the United States in 1949 were listed as follows:

Uncalcined:	
Portland-cement retarder	1,528,440 short tons
Agricultural gypsum	425,646 short tons
Other uses	35,807 short tons
Total	1,989,893 short tons
Industrial:	
Plate-glass and terra-cotta plasters	48,159 short tons
Plate-glass and terra cotta plasters	42,784 short tons
Pottery plasters	9,738 short tons
Orthopedic and dental plasters	110,954 short tons
Other industrial uses	211,635 short tons
Total	
Building—Cementitious:	
Base-coat plaster	1,824,790 short tons
Sanded plaster	112,375 short tons
To mixing plants	17,964 short tons
Gaging and molding	179,873 short tons
Prepared finishes	19,388 short tons
Other plasters	125,407 short tons
Keene's cement	44,624 short tons
Total	2,324,421 short tons
Building—Prefabricated:	
Lath	1,519,776 short tons
Wallboard	2,036,548 short tons
Sheathing board	102,825 short tons
Tile	163,587 short tons
Total	3,822,736 short tons

To Produce Masonry Cement

SOUTH DAKOTA STATE CEMENT PLANT, Rapid City, S. D., has been authorized by the cement plant commission to produce masonry cement. The sale of masonry cement is expected to add about 50,000 bbl. per year to the plant's production.

The plant will produce approximately 1,250,000 bbl. of portland cement this year, of which 100,000 bbl. are under firm contract and another 60,000 bbl. is expected to be taken by the government, mostly for work at the Rapid City air base. The commission reported that it is not taking any more large contracts until the 1951 South Dakota requirement is determined. However, the government may obtain whatever it needs under its priority.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of May and for the first five months of 1951 has been announced by the Portland Cement Association as follows:

	Square Yards Awarded During May 1951	Square Yards Awarded During First Five Months 1951
Roads	2,319,676	12,210,328
Street and alleys	2,339,279	9,744,926
Airports	1,278,152	4,355,249
Totals	5,937,107	26,301,503

HINTS and HELPS

PROFIT-MAKING IDEAS DEVELOPED BY OPERATING MEN

Windowless Plant

ONE OF THE LARGEST shippers of crushed, screened, "unpopped" perlite in the west is owned by a large metal mining company. A processing plant for treating ore has recently been completed. Of principal interest is the fact that this 1000 t.p.d. plant has been built without any windows. The company's experience has been that the glass either becomes dirty so that it won't transmit light, or the glass is soon broken. Fluorescent lighting is used throughout the plant, which has the advantage of giving uniform lighting conditions at all times.

New grinding plant has no windows

Simple Signal Circuit

By PAUL C. ZIEMKE

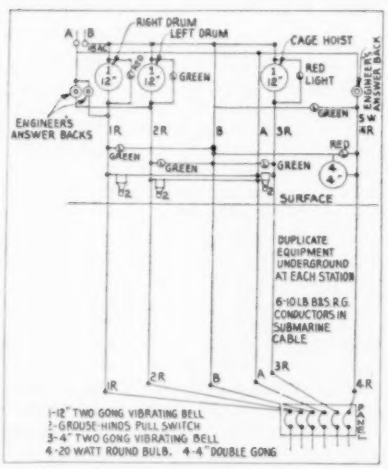
ILLUSTRATED HERE is a simple signal circuit which performs equally well with a-c or d-c. All that requires change is the type of vibrating bell. With the a-c installation, a 1:1 ratio transformer should be installed to isolate the grounded leg of the conventional 230-115-volt single-phase power and lighting circuit. It has proved beneficial to have a ground-free circuit that has the additional advantage of remaining operative, even though one leg is accidentally grounded. The simple two-lamp detector with grounded median connection serves well as the ground-indicating instrument.

While conduit installations, complete with pull boxes at strategic points have served reasonably well, there still remains the infiltration of moisture and the problem of anchoring the six No. 12-gauge conductors against the gravitational pull of their own weight. A lead-sheathed cable for the former problem, with individual insulated suspension for each conductor for the latter case, is usually the answer for the short-term installation, while the more permanent job will require the best in submarine-type cables for long trouble-free service.

Vibrating bells were chosen because of their wider range of tone quality and the fact that should inadvertent impulses be impressed on the circuit, the vibrating bell would register these more intelligently than the single-stroke type.

The lamps are a necessary adjunct to the circuit in that the engineer may instantly recognize which side of the circuit is signaling. Dual protection is offered against equipment failure; if the bell should fail, the lamps serve as a standby, or vice versa.

At a mine shaft collar, the lamps serve a dual function where they indicate the precision with which the sender is coding signals to the engineer and the correctness of their reception as the engineer answers back. This same feature is found at the shaft stations with an added feature.



Hoist signal system

The miner, not knowing where the cage is at the moment he arrives, watches the flashing of the green light as someone rings the engineer, and as the engineer answers he both hears the bell and sees the red light so that he may telephone the indicated station for service.

The distribution of the wiring at the engine room, shaft or head frame, and the several underground stations is simplified by the use of an insulated panel having double rows of non-ferrous bolts, six in number, mounted in a watertight metal cabinet. The cables or conduits are brought in from the underside of the cabinet to decrease the entry of water. The incoming, or upper, cable is fanned out to meet the respective upper six bolts or lugs and the lower or descending cable is thus fastened to the lower row of six lugs. To complete the installation and develop a continuous circuit, "jumpers" are inserted between upper and lower corresponding lugs.

The slate panel is identified with a sharp tool as follows, left to right: 1R, 2R, B, A, 3R and 4R. Should trouble develop in the main cable, removal of any jumper will isolate it at any station desired, and should the trouble be found in the station wiring, the removal of any wire from a lug clears the main circuit for continued operation while repairs are made.

While the plan calls for service to a balanced skip hoist and unbalanced cage hoist, it can readily be changed to suit most all installations, as long as two features remain undisturbed—feeder A and B must extend throughout the system, the panel technique of making junctions maintained, and the circuit kept isolated by use of the transformer at the power source.

Safe Storage of Dynamite

SAFE STORAGE OF DYNAMITE has long been a problem for construction firms and others who handle large quantities of the explosive. An eastern construction company uses about 8000 lb. of dynamite weekly and believes it has a solution to the storage problem. To store large amounts of the explosive near blasting sites and protect it against pilferage, the company uses two big welded-steel shipping containers. The 275-cu. ft. boxes with a weight capacity of 6 tons were developed by Dravo Corp., Pittsburgh, Penn., for steamship lines to eliminate pilferage, minimize breakage and ease pier and shipboard handling of export cargo.

Lined with 1-in. sheathing, this welded steel "Transportainer" has a capacity of 275 cu. ft. It can be used for storage of dynamite on field projects

It is said that the containers are ideal for dynamite storage and tool cribs because they can be transported by barge, ship, railroad car or truck.

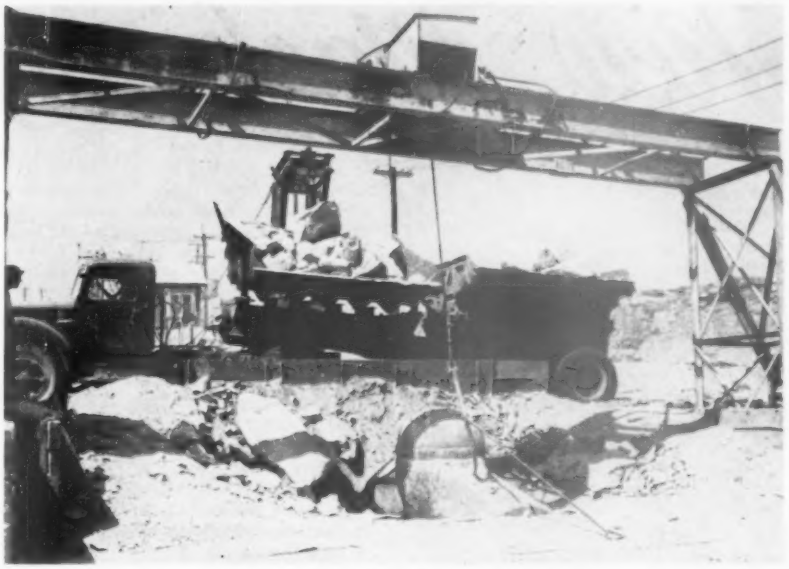
To minimize the hazard of sparks from contact of shoe nails or tools with the metal floor and walls, the dynamite containers are lined with 1-in. sheathing. This also acts as a barrier to lessen the impact of stray bullets in hunting areas. The boxes are weathertight and can be stored in the open.

Crusher Set-Up

THE GENERAL LAYOUT of a primary crusher set-up often determines the ultimate success of an operation. The illustration shown here has as its primary operation a 42-in. Allis-Chalmers gyratory, the throat of which is ample to take quickly most any stone the quarry has. The side-dumper hauls a 16-ton payload in two 8-ton Easton-type bodies. The gyratory is near enough to the quarry floor so that no uphill haulage problem is involved. The 42-in. offbearing belt allows ample capacity with a minimum of spillage at the loading point, even though 900 t.p.h. are crushed. The rock is a granite.

Two men operate the crusher, one being stationed at the hook, the other at the control switch of the equipment used to dislodge jammed rock in the throat of the primary crusher. As a safety precaution, the tender of the hook is given plenty of room to step back out of the way of any flying particles of stone. The dump assembly for the truck bodies uses a chain that rides sprockets instead of the more conventional wire rope and hook. Six churn drills are used in the quarry, drilling 6-in. holes, and two 4-cu. yd. Bucyrus-Erie electric shovels and a 3½-cu. yd. Lima diesel are used in the loading operations. Gondola loading is done at night and truck loading during the day. For a secondary crusher, an 18-in. gyratory serves a surge pile.

This is a large-capacity and well-balanced operation that has proved to be very successful and practical to the owner.



Side dumpers haul a 16-ton payload in two 8-ton bodies with gyratory near quarry floor to eliminate uphill haulage

Hard-faced Wheel Castings

IN A RECENT TEST conducted in a southern California cement plant, several centrifugally cast hard metal alloy wheels were substituted for hardened steel replacement wheels on the company's bucket-type conveyor. Excessive wear due to severe abrasion had been making too-frequent replacement of standard wheels necessary. The fine cement dust always present on the conveyor tracks wore flat spots on the wheel rims when bearings would seize or bind. Even the free-revolving wheels would be reduced in size by abrasion to a point where the conveyor had to be shut down for repairs.

Size of conveyor wheel can be judged from man's hand

Wheels shown in place on bucket conveyor. Hard metal wheel is second from bottom

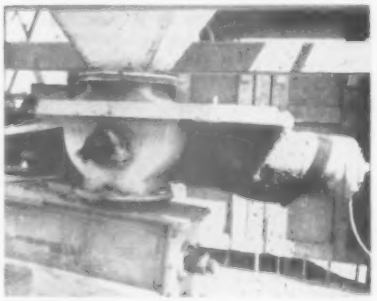
Cast Stoody alloy rimmed wheels were introduced at various points in the conveyor and their performance carefully checked. These first wheels were fabricated by turning down worn wheels and shrinking on cast hard metal tires to return the part to its required diameter. The original flange on each wheel was left standing. The tests proved successful, so all the wheels are now being replaced with castings made of a wear-resistant alloy designated as Stoody WB5. These new parts are furnished cast to the shape of the complete wheel with their outer surfaces as cast, and machine finished in the bore. Lathe work on worn wheels and costly machining of the casting for precision shrink fitting were eliminated as a result. A hard metal bearing surface in the bore was also gained by casting the wheel as a complete unit.

Rotary Valves

ROTARY VALVES are used to a great extent in portland cement plants as a means of feeding and controlling portland cement and other fine ground materials to screw conveyors and other units. Where a finely pulverized material is being fed to a screw-type conveyor, rotary valves can prevent "flooding" of the conveyor. Flooding of this type of conveyor can cause it to plug and thereby delay operations.

Since many ready-mixed concrete producers as well as manufacturers of concrete block use bulk cement under conditions where non-flooding is almost a "must," the rotary valve can be a real asset.

The unit shown in the illustration was handling hot dust collected by a battery of Multiclone dust collectors in a Haydite plant in the Northwest.



Gear motor (1½ hp.) drives the valve under dust collector

The valve was powered by a ½-hp. Century gear motor and was performing a good job under severe operating conditions.

New Machinery

ROCK PRODUCTS

Power Bucket

TRANSITIER TRUCK CO., Portland, Ore., has announced that its power bucket accessory for the handling of

Power bucket accessory for bulk materials handling

bulk materials is now available on all models Hi-Duty lift trucks. The bucket has a capacity of 9 cu. ft. and is constructed of high tensile strength steel, with a plow steel lip. Action is controlled by hydraulically actuated cylinders and the bucket opens and closes through a full 90-deg. arc.

Hard Surfacing Electrode

RANKIN MANUFACTURING CO., Los Angeles, Calif., has introduced a hard surfacing electrode, Ranite B-X, which is said to feature a 25 percent faster deposition rate. The increased welding speed of this new rod is said to decrease the heat induction into the parent metal by one-third, which minimizes heat strain and preserves the original physical characteristics of the metal.

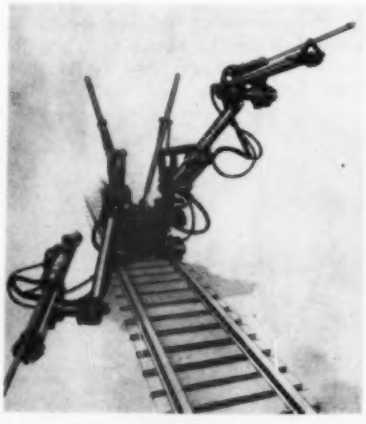
Mining Motors

GENERAL ELECTRIC CO., Small and Medium Motor Divisions, Schenectady, N. Y., has announced a new line of mining motors, said to be explosion-proof, and available in ratings from ½ through 60 hp. at 230, 250, 500 and 550 volts, with stabilized shunt, compound, or series windings. Standard motors are foot-mounted, but modifications can be supplied without feet for strap-mounting, or with a face or flange end shield.

Foot-mounted mining motor

Drilling Rig

INGERSOLL-RAND CO., Phillipsburg, N. J., is offering a boom jumbo drilling rig, designed for high-speed driving of drifts, cross-cuts and tunnels. This standard machine is capable of working in an opening with a maximum height of 10 ft. and a width of 12 ft., but the booms can also be purchased separately to mount for work in larger tunnels. Booms are of heavy seamless steel tubing with vertical supports.



Boom drilling rig

Air Vibrator

SPO, INC., Cleveland, Ohio, has announced the development of a heavy-duty air vibrator, Series 80, to be mounted parallel to the longitudinal direction of material flow. This is said to assure positive "in-line" movement of sand, ore, slag, etc. This machine, which can be operated vertically or horizontally, is recommended for use on conveyors, chutes and screens as well as on concrete block machines to settle the mix. Units operate on standard 80 p.s.i. line pressure and measure 8⅜ in. in overall length.

Bulk Material Truck Body

BAUGHMAN MANUFACTURING CO., Jerseyville, Ill., has developed a bulk material handling body. It is said that the material discharges as high as 16 ft. above the ground when mounted on a 39-in. truck frame. Unloading is accomplished by screw conveyors. Body capacities range from 325 to

Bulk material handling body of high tensile alloy steel

375 cu. ft., and unloading is at a rate of ¼ to 1 t.p.m., depending on the material handled.

Electric Recorders

THE BRISTOL CO., Waterbury, Conn., has announced production of its "Series 500" electric recorders, which make a continuous record of voltage or current on an 8-in. circular chart. It is said that a new measuring mechanism is featured along with other basic improvements including a die-cast aluminum alloy case which is moisture-, fume- and dust-proof. Recording ammeters and voltmeters are both furnished in a variety of models.

Portable Conveyor

THE FAIRFIELD ENGINEERING CO., Marion, Ohio, has developed the Model 666 lightweight troughed belt

Lightweight belt conveyor

conveyor, said to handle 75 cu. yd. of sand or gravel per hour. Standard equipment consists of a twin hydraulic boom hoist, underslung axle, slide trough and a 14-in., 4-ply belt. Lengths from 14 ft. to 25 ft. are available.

Portable Lubricator

GRAY CO., INC., Minneapolis, Minn., has redesigned its skid-mounted Convoy Lubers to fit the needs of improved earthmoving equipment. These Lubers consist of hose reels to dispense grease, oil and air; air-operated high, medium and low pressure pumps; an air compressor; a tool box; and combination storage drawers and reel mounting bases. Two types of Lubers are available, the hopper and drum models.

Air Conditioning Equipment

DRAVO CORP., Pittsburgh, Penn., has developed a new type of equipment for air conditioning cabs of cranes operating in high temperatures or in atmospheres contaminated by toxic and noxious gases or dusts. The company reports that with this equipment, known as the Split-Type Crane Cab Cooler, no ductwork is needed for installation because the cooling section is installed in the cab itself and the larger condenser section is placed outside on the crane.

Recording Instrument

WHEELCO INSTRUMENTS CO., Chicago, Ill., has in production a Multipoint Capacilog. The electronically operated unit is a deflecting type strip chart recorder which provides up to six permanent records on one chart. Measurement may be obtained with sensing units producing electric signals, such as thermocouples and radiation detectors.

Power Wheelbarrow

KWIK-MIX CO., Port Washington, Wis., is manufacturing a power wheelbarrow, the Moto-Bug, equipped with interchangeable front-end attachments including a power-driven fork lift attachment, a gravity dump hopper flatbed platform, scraper blade and a manually operated fork lift. The power-driven fork attachment has a 1000-lb. lift capacity and raises the load to a maximum height of 30 in. A 4-hp. gasoline engine furnishes the power and direct steering to dual rear wheels allows the machine to turn in its own length.

Wheelbarrow with power-driven fork lift

Field lubricating equipment

Spring Belt Conveyor

FLEXOVEYOR MANUFACTURING CO., Denver, Colo., has produced a motor driven conveyor especially designed to operate in connection with valve

Valve bag packer conveyor

bag packers. A series of endless spring belts running over grooved rolls forms the conveying element, which is reversible, and any loose material drops through the springs and onto the floor where it can be cleaned out at regular intervals. Refer to article "Huron's Program to Increase Cement Production," in the January, 1951, issue of ROCK PRODUCTS, p. 94, for an application of this conveyor.

Electronic Recorder

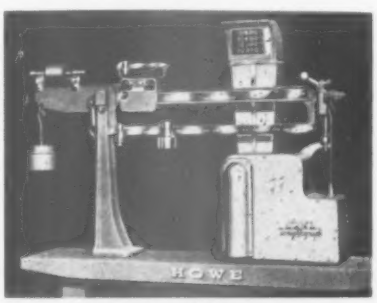
LEEDS & NORTHRUP CO., Philadelphia, Penn., has announced production of its 2-pen Speedomax electronic recorder, which records two functions simultaneously against time. This instrument is said to save tedious compilation and point by point plotting since both functions are drawn as continuous curves on a 9⅞-in. wide chart, and users can follow swift-changing variables with ease. Recording pens operate overlapping or side-by-side, either across full scale or a specified portion of the full width. Speed of response for full scale movement is 3, 2 or 1 second, and the chart speed can be selected in the range of 1 to 1800 in. per hour.

Air-Fuel Controller

LEEDS & NORTHRUP CO., Philadelphia, Penn., has announced an air-fuel ratio controller, which is said to adjust air flow to fuel flow changes rapidly, yet without cycling. The company states that it is applicable to oil or gas firing, or to dual-fuel furnaces, metering fuel and air flow for maximum accuracy of control. Models are supplied to operate an electric or a pneumatic control valve.

Scale Unit

THE HOWE SCALE CO., Rutland, Vt., has developed the Howe 77 Weightograph, which can be attached to any beam scale, or to any scale convertible to beam operation, by affixing it to the beam shelf and connecting it to the beam with a rod. The unit features a non-protruding periscope with an eye level screen which flashes the weight in large figures. The reading line length is 15 ft.



Automatic weight indicator

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In foreground is the 250-ft. thickener. Processing mill is behind it

Large mining operation in Nevada employes belt conveyors to effective advantage and suggests practical ideas for best performance

HANDLING LARGE TONNAGES OF GRAVEL

By WALTER B. LENHART

YEARS AGO WHEN the automobile with its attendant road building programs first came into being, the rock products industries had to borrow operating ideas from the already established metal mines. At that time there was no such thing as a conventional design for an aggregate plant and no equipment was being manufactured specifically for the infant rock industry. An imposing list of pieces of equipment now in common use in the industry could be made enumerating items that first found a use in the mining industry. These items range from crushers to screens, ball mills, elevators and so on. Thus the rock products industries, in a measure, owe a debt to the older mining pioneers.

As the rock industries grew larger and larger, the production problems began almost to coincide with the problems of the miner until today we are inclined to think of all types of mining as being fundamentally a material handling problem. In some cases, as in dredging operations in the placer mines of the West, the material handling aspects practically parallel sand and gravel bucket dredging operations.

A tremendous volume of material is handled at a plant located almost in the middle of the Nevada desert. This plant, operated by the Round Mountain Gold Dredging Corp., Los Angeles, Calif., is reputedly the largest materials handling operation in the world. It is essentially a gold placer operation, i.e., extraction of free gold associated with sand and gravel and other rock fragments. It is interesting to note that many ideas for the long belt conveyor installations were borrowed from aggregate producers along the West Coast. The

The 60-in. pendulum belt conveyor at right feeds the 36- x 42-in. jaw crusher (in center)

engineering staff of Yuba Manufacturing Co., under the direction of Edgar Von Bolhar, designed the plant and assisted in its installation.

The Nevada operation is located about 55 miles north of Tonopah at an elevation of 6300 ft. Because of water limitations and other reasons, conventional dredging was not feasible, so a large scale shovel operation involving belt conveyors for transportation was installed. The preliminary handling of the gravel generally parallels that of the Irwindale plant of the Consolidated Rock Products Co. (see ROCK PRODUCTS, October, 1950, page 101) in which a pendulum conveyor is used in the pit, followed by a preliminary crusher, and the final product is conveyed by belt to the surge pile.

The pendulum conveyor uses a 60-in. Goodyear cord belt and is 150 ft. long, so with the shovel—a 7½-cu. yd. Bucyrus-Erie 170-B electric unit—and its dipper stick, a swath 450 ft. wide (225 ft. radius) is possible. The depth of the deposit to be mined, at time of inspection, was about 125 ft., but eventually will reach depths in the 350 ft. range.

The bank of the pit is kept at about 70 deg. and on the brow a second 54-B Bucyrus-Erie crane is mounted. It slings a 7000-lb. 5-toothed scarifier which, similar to practice at the Irwindale plant, keeps the brow trimmed down and reduces the hazard of a caving bank to the 7½-cu. yd. shovel below. The teeth in the scarifier are shovel teeth.

The general plan of pit operation is to work the pendulum and related equipment down-grade following close to bed-rock contours until the optimum depth horizon has been reached, then to cut a swath across one end of the property from end line to end line. In all, it is expected that a total of 67,000,000 tons will be excavated.

This swath will be close to 7000 ft. long so that as the pendulum belt is moved ahead field belts of sufficient length will be interposed as needed. In anticipation of this, the company has on hand a steel frame that comprises a head pulley along with the necessary guide and take-up pulley so that it can easily be placed in the conveyor line. The same steel frame provides for a tail and guide pulley for the offbearing belt served by the conveyor belt that will pass over the head pulley. All head pulleys are lagged with a special fluted rubber lagging to insure better traction. The idlers were all supplied by the Link-Belt Co. On hand are sufficient 30-ft. steel framework sections, along with the appropriate number of carrier and return rolls, to extend the conveyors as the pit advances. On this

type of belt conveyor work Flexo belt lacings are used, but on the longer permanent belt installations vulcanized joints are used. The Goodyear Rubber Co. does the vulcanizing. From the illustrations it will be noted that the "take-ups" on the field belts are vertical and relatively short.

Handling 67,000,000 Tons

A conventional aggregate operation that expects to handle that large a tonnage also expects the yearly production to be sold and transported away from the plant, except for a modest stockpile. But here, due to the remote location of the operation, it is very doubtful that any aggregate will be sold. As a result these operations will have to stack practically all of the 67,000,000 tons of material, and doing that economically requires special equipment and items that conceivably could be used by commercial producers.

However, if some commercial producer wants to buy the current production, amounting to 17,000 tons per day, William C. Browning, vice-president, Round Mountain Gold Dredging Corp., says, in effect: "Here is a chance to buy for a few cents per ton material that has been scrubbed in an 8- x 50-ft. scrubber-trommel, a coarse sand and a fine sand made from the minus ½-in. material going through the trommel, and all after thoroughly being washed is recombined and sent to the two giant stockpiles." For that is essentially what happens to the sand and gravel at Round Mountain.

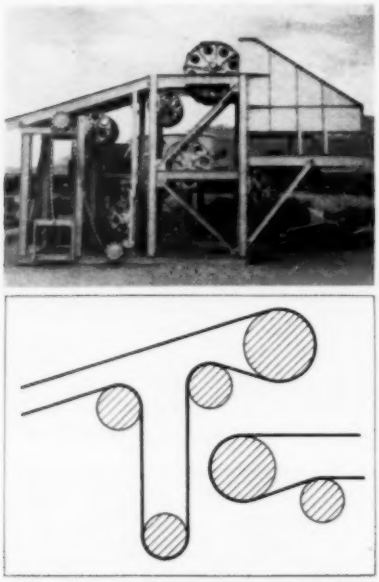
The pendulum conveyor delivers the pit-run material to a 36- x 42-in. Birdsboro jaw crusher. The crusher assembly is mounted on widely spaced industrial rails so it can move ahead with the pendulum. The rock is crushed to minus 8 in. and falls to a long inclined 42-in. American belt that is mounted on temporary wooden cribs. This belt takes the material practically all the way out of the pit. The head assembly on this inclined belt includes a No. 20 Falk back-stop. Near the rim of the pit a transfer station unloads to a 1735-ft. center to center Goodyear belt that at the feed end is a little lower than most of the belt. Essentially it is a long, straight belt, permanently mounted on concrete footings and steel framework. This belt delivers to a second belt that serves the 200,000-ton capacity surge pile (50,000 tons live load.)

The 7½-cu. yd. Bucyrus-Erie shovel delivers all the pit material to a steel cylinder over which is mounted a specially designed flat, 5-bar grizzly spaced on 30-in. centers. The three center members of the grizzly are of manganese steel and each weighs 2300 lb. The grizzly is hinged so if any plus 30-in. material accumulates on it, another 54-B Bucyrus-Erie diesel unit kept nearby as a clean-up unit, can

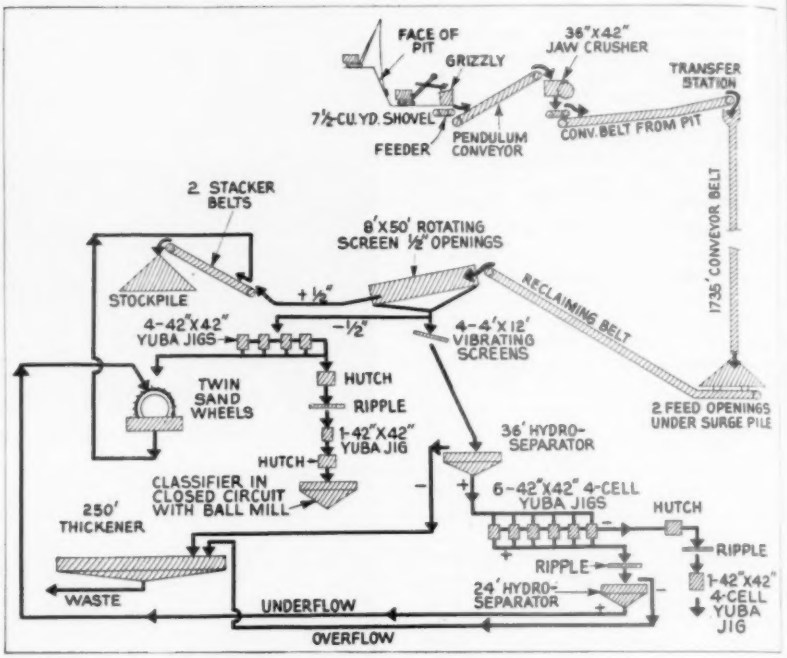
The two movable radial boom stackers will eventually stockpile 67,000,000 tons of material

View in pit showing shovel feeding 14-ft. dia. hopper over pendulum conveyor. The five grizzly bars are spaced 30 in. apart

Fingers over the 60-in. pendulum conveyor belt help prevent roll-back of gravel by moving in direction of belt travel only



Prefabricated field head-tail pulley assemblies are kept on hand. Photograph (top) shows one unit, and drawing below shows location of belts in place



Flowsheet of Round Mountain Gold Dredging Corp. plant

Type of overflow used on the 250-ft. thickener

Surge pile is fed by the 42-in. belt which is held at its elevated end by a 138-ft. steel tower, providing a fall of 110 ft. for rock

lift it and dump the oversize onto the pit floor. There the rock can be mud capped and blasted, or the RD-8 Caterpillar tractor and dozer can push it to one side. The larger shovel digs to within about 3 ft. of bed-rock and the 54-B, with a 2½-cu. yd. Esco bucket, cleans up the remnant sand and gravel. Under the bin served by the grizzly is a heavy-duty Jeffrey vibrating feeder that puts the rock onto the pendulum belt.

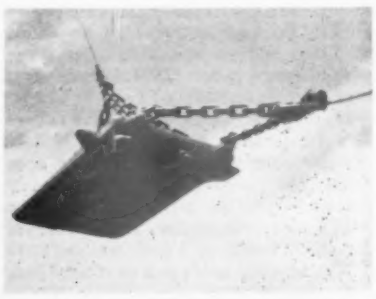
Belt Conveyor Ideas

The 60-in. belt serving the Birdsboro crusher is provided with devices that are intended to prevent "roll-back" of gravel passing through the crusher. These consist of vertical metal segments hanging vertically over the belt and hinged at the top in such a manner that rock can go uphill and under them, but cannot return once the gravel boulder gets past the unit. A round piece of gravel that is inclined to roll, if stopped, becomes more or less stabilized by the use of these preventive devices. The illustrations show the general nature and location of these devices.

All belts run without cover and if stopped for any reason are left loaded with rock to reduce the wind hazard, which at times in the area is serious. Lubrication of the conveyors is on a split-shift basis.

The long flat conveyor (1735 ft.) runs practically east and west and in this section, in the hot summer months, the sun warms the south half of the steel framework carrying the belt, causing some expansion that tends to let the belt run out of line. Then in the afternoon the sun hits the other half and another series of expansions start along with relief contractions on the other half. But even so, it is not serious and by slightly loosening an end plate here and there, along with self-aligning carrier and return rolls interposed as needed, the belt does a good job. The self-aligning units are Link-Belt. There are three top and three lower

Tunnel under surge pile houses a 36-in. belt, 445 ft. long; feed is controlled by twin electric feeders operated from the mill



This 7000-lb. scarifying plate with seven teeth is used to loosen walls of pit

belt aligners on the long belt. The conveyor after its initial break-in period had one of the 22-ft. sections installed at its toe-end to offset expansion and belt-stretch as the short vertical take-ups were not adequate.

The belt set-up is designed around the use of 200 hp. as a maximum and standard where possible, and some success has been attained by the use of two 100-hp. motors, one on each side of the drive assembly. The long belt uses a 50-hp. motor and the pendulum a 100-hp. Westinghouse gear motor.

The belt serving the stacker for the surge pile is mounted from a steel framework that is 135 ft. high with the outboard end of the belt 100 ft. from the ground. It requires 200 hp. to run it.

The pendulum belt at its regular operating speed will handle 2000 t.p.h. The offbearing belts from the pendulum run 450 f.p.m. or a little over 5 m.p.h. The pit normally runs 24 hr. per day and can easily keep the 200,000-ton capacity surge pile supplied with material. Reclaiming from the surge pile is via a 36-in. belt that operates in a reinforced concrete tunnel 10 x 10 x 190 ft., with two draw points that are each provided with a heavy-duty Jeffrey vibrating feeder. The draw points are 131 ft. and 182 ft. from the portal of the reclaiming tunnel. If need be the RD-8 Caterpillar and dozer can push material in the surge pile to the draw points. All gravel and sand going to the plant on this belt is automatically weighed on a Merrick Weightometer with rate of delivery observed on a Ratograph located near the rheostat in the plant.

The pit will eventually be up to 370 ft. deep. Crane with scarifying plate on crest of pit brings material down into pit, where a 7½-cu. yd. electric shovel (behind conveyor) loads pendulum feed hopper

Conveyor in foreground is 42 in. wide and 1735 ft. between centers; it carries material from the pit to the surge pile stacker

Plant Operations

The 36-in. belt delivers to an 8- x 50-ft. Yuba trommel scrubber screen which is provided with ½-in. openings. Here the material is washed thoroughly and the plus ½ in. is rejected at once and sent to the stacker belts. The minus ½-in. material is separated into a coarse and a fine fraction on a battery of four 4- x 12-ft. Tyrock vibrating screens that operate in two banks with the feed split evenly between them. The gold in the pea gravel is recovered on a series of Yuba jigs. The fine sand portion is dewatered in a 36-ft. hydroseparator after which the valuable metal is recovered in a series of jigs and ripples with a second dewatering by a 24-ft. hydroseparator. The underflow from the hydroseparator is dewatered on a 12-ft. dia. Yuba sand wheel. The sand joins the plus ½-in. portion on the stacker belts. The hydroseparators were made by the Progressive Engineering Co., San Francisco, Calif. The two hydroseparators take the load off the larger and final thickener. The overflow from the hydroseparators is mostly minus 100-mesh material.

There are two stacker systems in use, each of which uses 36-in. belt conveyors. At time of inspection both were working on the side of a 20 percent grade and building the stockpile to a greater height. When each stockpile gets to be roughly 400 ft. high, the disposal section will level off and work in a comparatively flat grade. The inclined belt will at that time be about 700 ft. long and will be driven by two 100-hp. motors.

The disposal end of the stacker is a heavily constructed unit and weighs about 40 tons. It is provided with a boom conveyor at its outboard end that is 60 ft. long. The boom can swing in a 180-deg. arc so that a wide stockpile can be built. Two stackers are provided so that one can be in use while the other is being advanced. Moving ahead on the inclined slope is accomplished by the use of the Caterpillar tractor and dozer.

Water in the area is not very abundant so dirty water from the plant flows to a 250-ft. Dorr traction thickener and some water is reclaimed. The thickener is of unusual design in that in-flowing pulp enters the thickener at a section of its perimeter instead of at the center. The overflow is from the remaining arc of the perimeter (see drawing). The unit was first installed at a manganese treating plant near Las Vegas, Nev. that operated during World War II. At its original location the thickener was used in an acid circuit so that part below the solution line, on this thickener, is of acid-proof construction.

The underflow is pumped to waste by a battery of 6-in. Duplex Dorrco diaphragm pumps. The overflow from the thickener is not water clear but

(Continued on page 92)

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Legislation Dominates Silica Meeting

Car supply, improved packing methods and industrial hygiene legislation also emphasized at annual meeting

NATIONAL INDUSTRIAL SAND ASSOCIATION'S fifteenth annual meeting, held May 16-18 at The Homestead, Hot Springs, Va., had a diversified program and was highlighted by round-table, informal discussions of industry problems. Production problems, traffic matters, federal laws and restrictions, industrial health, foundry sand problems and a round-table discussion of current problems confronting the industry were covered, followed by an extremely interesting talk on the Washington scene by executive secretary V. P. Ahearn.

Sterling N. Farmer, Sand Products Corp., Cleveland, Ohio, was re-elected president of the association as were vice-president C. M. Hardy, Hardy Sand Co., Evansville, Ind., and treasurer Clarence R. Wolf, New Jersey Silica Sand Co., Millville, N. J.

Due to a constitutional provision limiting members of the board of directors to a two-year term, three new members were elected at the meeting. They are Earl T. Andrews, Pennsylvania Glass Sand Corp., Hancock, W. Va.; Emery M. Durstine, The Keener Sand and Clay Co., Columbus, Ohio, and P. W. Palmer, Browntown Silica Co., Browntown, Wis. Russell G. Cronenweth, Great Lakes Foundry Sand Co., Detroit, Mich.; Lyle T. Manley, Manley Sand Co., Rockton, Ill.; and Jesse T. Morie, Jesse S. Morie & Sons, Inc., Mauricetown, N. J., complete the board of directors. Past presidents J. M. Strouss, Deckers Creek Sand Co., Morgantown, W. Va.; A. Y. Gregory, Whitehead Brothers Co., New York, N. Y.; and George A. Thornton, Ottawa Silica Co., Ottawa, Ill., are ex-officio members of the board of directors.

The fall meeting of the association will be held at The Greenbrier, White Sulphur Springs, W. Va., October 17-19. An agreement has been concluded with The Homestead to hold the annual spring meetings at Hot Springs, Va., through 1956. The 1952 fall meeting is scheduled for Bermuda during October, dependent upon accommodations available.

Opening Session

Sterling N. Farmer, president, presided over the opening session at which were presented the financial report by executive secretary V. P. Ahearn and the report on nominations. They followed a discussion of traffic matters led by Emery M. Durstine, chairman of the traffic committee and Commerce Counsel William W. Collin, Jr. Mr. Durstine commented briefly on two cases being conducted by the association in the interests of its membership.

Mr. Collin did not have a prepared paper. He touched upon the decision handed down on March 30 in the bonded sand case which resulted in obtaining a reduction in rates for open car shipments which is substantial for long hauls but leaves the differential as it was for distances under 300 miles. The decision isn't all that was hoped for but Mr. Collin recommended that a re-hearing not be sought at this time by the association because it was unlikely that testimony could be improved. The box car case went to trial on March 14 and with the support of the Glass Container Manufacturers Institute.

Commenting generally on the subject of freight rates, Mr. Ahearn said that he believed the association should participate in freight rate cases as a matter of good customer relations in attempting to hold their costs down, particularly during times of price controls. Furthermore, he believes that the industry has a right to oppose any cost increases that reflect in prices, in order to protect its markets.

Production Problems

Arnold Tanzer, New Jersey Pulverizing Co., New York, N. Y., reported on his experiences with new bagging machine parts supplied in an effort to reduce maintenance and to minimize the dust problem in packing operations.

Due to delays in delivery of the parts, of special high priced alloy, Mr. Tanzer could speak from only six weeks' experience with the new parts. After six weeks of experience, none of the parts had been replaced but neither had those of ordinary metal in the same service over the same period. There was indication of wear on both the ordinary and special alloy parts. While he believes the special alloy may last longer he does not believe their life will be sufficiently greater to justify the added costs. These parts are priced four times as high as conventional metal parts. Mr. Tanzer believes they would be difficult of replacement and he has not noted any improvement in the dust problem.

Norman H. Cussey, Wedron Silica Co., Chicago, Ill., reported his experiences with the Auger-Matic packing machine. His experience has been satisfactory in packing sand blast sand, using valve bags, after certain needed adjustments. This is a one-tube machine that will pack unground sand at the rate of 800 bags per day. Its use has proved satisfactory in experimental packing of ground silica, with

Left to right (in picture at left): Mr. and Mrs. T. E. Rust, Clayton Silica Co., Waterloo, Iowa, and Mr. and Mrs. H. P. Hardy, Hardy Sand Co., Evansville, Ind. Right: P. W. Palmer, Mrs. Marcus Wright, Jr., Mr. and Mrs. Arnold Tanzer and Marcus Wright, Jr.

Mr. and Mrs. Jesse T. Morie, Jesse S. Morie & Son, Inc., Mauricetown, N. J.

Group of industrial sand producers at picnic

Sterling Farmer, Sand Products Corp., Cleveland, Ohio, president of N.I.S.A.

no leakage of flour, but no attempt had yet been made to pack hot silica under normal plant conditions.

As compared to the familiar Bates packing machine, the capacity is much lower, but Mr. Cussey believes the machine might be ideal for the smaller plants and others which do a limited amount of bagging. As far as dust is concerned, there is a good cut-off and no leakage and apparently it affords some hope of alleviating the dust problem.

Stanton Walker concluded the first session with a review of foundry sand problems. Mr. Walker added his observations on the subject of packing machines, he having been active in the study underway to improve packing practice. He mentioned a machine manufactured in Chicago and also the 4-tube packer developed by Browntown Silica Co. which is now in production.

In commenting on sand research, Mr. Walker said that the Sand Research Division of the American Foundrymen's Association has not been very active in recent years. The sand testing handbook is being enlarged and revised and will be ready for distribution in six months. A new committee is being organized to consider core mixtures using binding resins. Physical properties of high temperature molds are being studied. The grinding and fineness committee has had one meeting in two years and has developed a secondary standard for testing sand.

Mr. Walker said that there was much data available in his office on the subject of foundry sands as a result of a surprising amount of work that has been done by the association. This work, he said, has resulted in the good specifications that presently prevail.

As a result of recent questions by two industrial sand producers, Mr. Walker has been endeavoring to secure information on the relative efficiencies of steel grinding balls and flint pebbles as used in grinding mills. Steel balls have proved most efficient. According to his findings, in the portland cement industry the consumption of steel balls is 0.2-0.5 lb. per ton of cement production. For silica, the consumption would be about 1 lb. per ton of flour produced.

Business Conditions

C. M. Hardy, vice-president, presided for the second general session which considered the railroad car situation, priorities and prices.

C. R. Megee, vice-chairman, Car Service Division, Association of American Railroads, outlined the outlook for railroad cars and suggested ways in which shippers can cooperate to improve the car supply situation. He opened his talk with the statement that production and distribution constitute a joint problem, and by saying that we can have available in the United States as much of commodities as we can transport.

The industrial sand industry, with a current annual production of 12,000,000 tons, requires 200,000 carloads per year but a total of 850,000 carloads per week are currently being loaded by the railroads.

Whereas a great number of cars were put in service over a three-year period, there still exists a great demand for new cars and the principal reason for the current shortage has been lack of materials with which to build them. The need now is for 300,000 cars at a time when 60,000 cars a year are scheduled for retirement. As of April 1, 1951, there were 156,000 cars on order from the carbuilders, of which 60,000 are box cars, and 2400 locomotives.

Mr. Megee pledged that the number of unserviceable cars will be reduced sharply. As of April 1, there were 81,000 cars waiting for repairs and 40,000 had been restored to service since August, 1950.

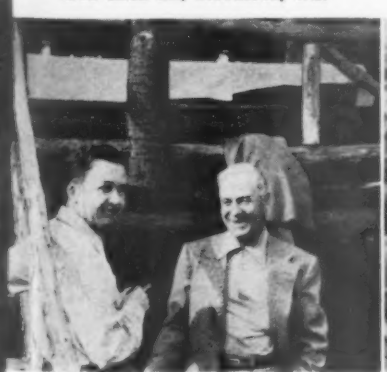
The program for new cars, as set up in October, 1950, calling for 10,000 cars a month over a two-year period has not yet been reached. The railroads added 8000 new cars in April, 1951, and 9000 were expected in May.

Steel is the critical item and the

G. M. Mason, Clayton Silica Co., Waterloo, Iowa, left, chats with P. W. Palmer, Browntown Silica Co., Browntown, Wis.

Marcus S. Wright, Jr., and Marcus S. Wright III, South River Sand Co., Old Bridge, N. J.

Arthur B. Schlesinger, New Jersey Pulverizing Co., New York, N. Y.



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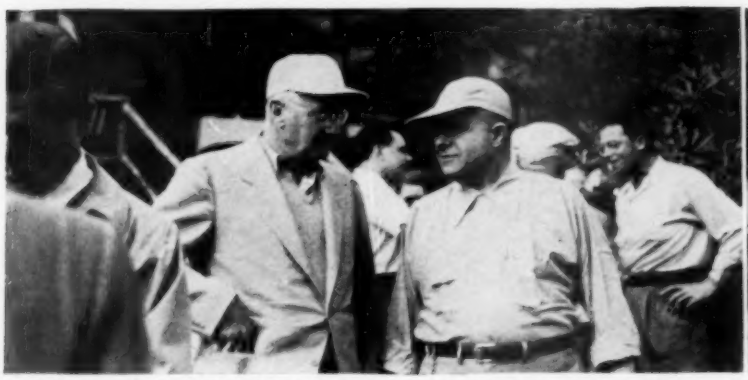


Left: Stanton Walker, left, and Lyle T. Manley, Manley Sand Co., Rockton, Ill., discuss "signals" or something. Right: Russell Cronenweth, Great Lakes Foundry Sand Co., Detroit, Mich., with Mrs. Cronenweth at picnic

disturbing element is that there is a move now to cut the quantity of available steel that has been promised. An allocation of 170,000 tons of steel per month had been provided for car building and that may be reduced. There is also a move now to cut the railroads' MRO quota about one-third.

Carbuilders have been lagging on filling orders since the first of the year and the net gains in car ownership have been slow. Box cars will be the most serious bottleneck in the months ahead and gondolas will be the number two problem.

According to Mr. Megee, armament production increases will reflect in heavy car requirements beginning about October, 1951. The shortage of water shipping facilities is another factor, with some 500 carloads of Minnesota iron ore being shipped daily. Of an estimated 87,000,000 tons of iron ore to be shipped this year from Minnesota, 4,000,000 tons will come by rail.

On the other hand, it was pointed out that some industries are cutting production during the transition to war goods manufacture which will release some cars immediately. The winter wheat crop was down so the movement of grain in box cars will not be too serious this year. With 24,000 covered hoppers on hand and 5000 on order, the situation there is an improvement over a year ago. There are some 70,000,000 tons of coal in stockpiles now as compared to 24,000,000 tons a short time ago, which is favorable. It is Mr. Megee's belief that the use of covered hoppers to transport cement for off-shore defense construction will not prove serious because the hauls are short and the turn-around time is quick.

Mr. Megee urged that the industry cooperate in order to get most benefit from existing cars. He stressed the need for quicker turn-around time. The average turn-around time was 15 days for the month of April which, if reduced to 14 days, would theoretically mean 100,000 more available cars. He also suggested that more hoppers be used in preference to gondolas whenever they can be used.

Government Restrictions

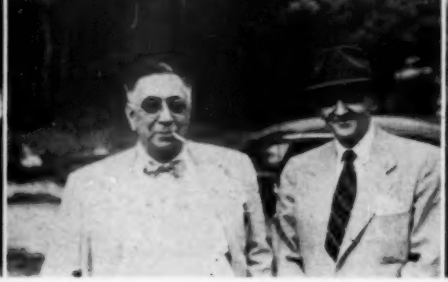
Government regulations and the workings of restrictive measures were interpreted in detail by executive secretary V. P. Ahearn in an informal discussion with participation by the membership. Speaking on the subject of OPS and price regulation, Mr. Ahearn said that an industry advisory committee will soon be appointed to work closely with OPS. He said that the industrial sand industry must anticipate a roll-back to pre-Korea prices for its products. The industrial sand industry, in its dealings with OPS, is taking the position that price control is not essential for the industry because of the competitive nature of the business but it is doubtful that this recommendation will be approved.

Mr. Ahearn next discussed the problems and procedures involved in securing equipment and repair and operating supplies. Defense Minerals Administration is the clearing agency for all mining operations and has under its jurisdiction the approval and allocations for access roads, housing, machinery, expansion programs, MRO items, etc. At present, a priority system order similar to the P-56 order operative during World War II is being formulated and the MF-100 serial form being issued will serialize plants, covering MRO items and minor capital additions. Emphasis will be on keeping existing plants in operation.

Industrial sand producers will secure a mining priority for MRO items which Mr. Ahearn believes will be a high one. Each plant will have a separate serial number although several plants of a company in the same area and covered by a common bookkeeping system may be covered by a single serial number.

The outlook for steel is not good and the demands for direct defense manufacturing are expected to require more than 50 percent of the total output beginning in July and

Left: Norman H. Crissey, Wedron Silica Co., Chicago, Ill. Center: Vice-president C. M. Hardy of Hardy Sand Co., Evansville, Ind., left, with executive secretary V. P. Ahearn. Right: A couple of live wires at the picnic were Ralph Lebold, Michigan Silica Co., Rockwood, Mich., left, and Arnold Tanzer, New Jersey Pulverizing Co., New York City



August. There will be a rising tempo of demands for all critical materials with the result that the supply situation will become tougher than ever known before.

Industrial Health

Association counsel Theodore C. Waters, in his annual report, covered current developments in matters of industrial health, including an analysis of legislation introduced in the various states during the last legislative year and discussion of industrial hygiene codes.

In introducing his subject, Mr. Waters pointed out that industrial hygiene is assuming new and increasing importance each day and that the industry is beginning to reap the benefits of the activities of bureaus of industrial hygiene in the various states. Compensation benefits have been materially increased, he said, and the trend is continuing upward. So, he emphasized, it is good business for every employer to consider the cost of compensation benefits and to do whatever can be done to protect employes from injuries and occupational diseases.

In discussing legislative developments in workmen's compensation during the calendar year 1951, he said that all but four state legislatures have been in session. Some are still in session and developments are not yet known.

As of the end of 1950, 41 states had enacted occupational disease compensation schedules, and this year the state of Vermont has enacted a scheduled occupational disease statute making silicosis compensable. An interesting point was that for all diseases made compensable only total disability or death receives benefits. For silicosis, there is a limitation of liability of graduated benefits beginning at $400 in the first month the act became effective and increasing at the rate of $25 per month with an overall maximum of $4000.

Several bills have been introduced in the state of Oklahoma to make occupational disease compensable and apparently the committee favored the adoption of a schedule law including the disease of silicosis with special provisions limiting monetary liability, denying compensation for partial disability and including special limitations with respect to the time for filing claims.

Despite the opposition of producers, the silicosis and asbestosis compensation statute effective since January 1, 1945, was repealed, which makes dust diseases compensable without certain desired protective features. Among them are limitation of monetary liability, denial of compensation for partial disability and restrictions limiting the filing of claims.

As far as the important state of Pennsylvania is concerned, it was predicted that there would be substantial increases in compensation benefits but no changes in the occupational disease provisions of the act.

At present, there are 21 states with special limitations applicable to silicosis, of which 15 deny compensation for partial disability. In those states, rates are less than half of those in states where partial disability is compensable.

As of January 1, 1951, 24 states provided general coverage for occupational diseases while 18 provided scheduled coverage. With respect to amendments, there has been substantial increase in benefits with prospect of further increased benefits soon. The result is an increase in compensation costs with a rise in rates which will become effective next year.

With respect to the proposed state occupational health and safety bill of the U. S. Department of Labor, Mr. Waters said that the bill indicates the purpose of state labor departments to increase their activities in this field. The draft is being distributed to state departments as a guide for legislative action. Mr. Waters' criticism is the contemplated assignment of the administration of the bill to state departments of labor rather than state departments of health and that this plan constitutes another field of legislative activity designed to control and regulate business.

Speaking on industrial hygiene codes, he said that the code prepared by the United States Public Health Service is being considered by the American Standards Association and will later be submitted to state departments as a guide to the promulgation of other codes.

Mr. Waters said that, according to the National Council on Workmen's Compensation Insurance Rating, the national experience in silicosis claims has continued excellent and that there is a trend developing that will result in further decreased insurance rates as a result. Mr. Waters credited the association with playing an important part in the favorable action. However, increased benefits of 25 to 50 percent are being considered in new legislation covering workmen's compensation insurance rates generally.

Following this talk, a question was asked with reference to "products liability" claims which might be made against a producer in the event that an end product, like glass for example, might not be up to standard and the glass manufacturer might attempt to attach the blame to a defective sand. Mr. Waters does not believe such claims can be justified and he said that insurance companies do not know how to assess premiums for such coverage. It represents a new field of insurance and rates are high.

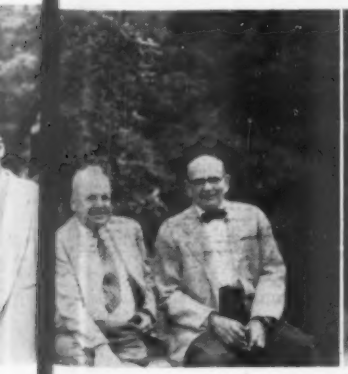
Government Regulations

The concluding session, under the chairmanship of Clarence R. Wolf, was divided into an informal roundtable discussion on government regulations and other industry problems led by executive secretary V. P. Ahearn, followed by an extemporaneous speech on the Washington scene by Mr. Ahearn.

Mr. Ahearn had covered some of the industry problems generally, in the preceding session. He cautioned that serious penalties may be levied in violations of the wage stabilization laws, as drastic as disallowance of the total payroll for income tax purposes.

At present, Mr. Ahearn said that

Left: Henry Roeser, Jr., New Jersey Silica Sand Co., Millville, N. J. (left), chatting with James H. Whitehead, Whitehead Brothers Co., New York City, at picnic. Center: Mr. and Mrs. W. B. Gyger, Ottawa Silica Co., Ottawa, Ill. Right: William J. Woods, Jr., Pennsylvania Glass Sand Corp., Pittsburgh, Penn. (left), chats with John H. Miller, Mifflin Sand Co., Lewistown, Penn., as Stanton Walker approaches in background



there is a great fight for power now underway between labor and health agencies in Washington. This battle for power will continue in the states with the result that there will be pressure on the industry, there being great public opinion throughout the country to protect the workers.

The industrial sand industry likely will be exempted from renegotiation, in which case the industry will be fortunate because renegotiation applies generally to all sub-contracts.

Speaking on the subject of construction limitations, it was mentioned that industrial construction has been placed under licensing for the first time. A license is required if more than 25 tons of steel are needed for such construction even if the necessary steel is on hand in advance. Accelerated depreciation is provided for in DPA regulations based on a 5-year plan. Such amortization is permissible covering the percentage of production used in actual defense and will be difficult to obtain.

The board of directors has decided that the association again conduct a wage rate survey similar to the one completed last year. These studies are considered of value in negotiations with unions. Mr. Ahearn cautioned that the sixth round of wage increases is coming, which will put heavy pressure on the industry for pay raises in the face of a growing shortage of available help.

He believes that the five percent percentage depletion allowance recently approved for the industry by the House Ways and Means Committee has a good chance of approval by Congress although there will be difficulty in getting it through the senate. Efforts will be continued to secure the 15 percent allowance originally sought. Mr. Ahearn paid tribute to Charles Brady, Lilesville, N. C., and J. Rutledge Hill, Dallas, Texas, for their fine work in presenting the case for the industry in conjunction with the sand and gravel industry.

Procurement of MRO items and capital equipment was discussed but, by the time this report is published, there may be more recent orders that have changed the picture.

The industry is subject to regulation 4 of D.M.A. for M.R.O. items and for minor capital equipment costing less than $750, said Mr. Ahearn. He recommended that DO-97 forms not be used unless a producer is forced to use them.

While quotas for MRO items are limited, on a quarterly basis, to the amount purchased for the corresponding quarters in 1950, the trouble is that higher prices have developed at a time when more supplies are needed. If the allotted amount is insufficient, a producer should apply for a greater quota.

In the case of major capital equipment, it was suggested that producers apply directly to H. A. Montag, director, Requirements Division, Defense Minerals Administration in Washington. Through use of this procedure, Mr. Ahearn said that two concerns had been successful in securing their requirements within three weeks. He did not know of any rejections. It was suggested that a list of customers be attached to such applications and that evidence be offered that the equipment was unattainable without a priority, preferably by letters secured from manufacturers as proof.

As of the time of Mr. Ahearn's talk, rubber goods and bags were no longer covered by DO-97 ratings and must be purchased on the open market or, if unsuccessful, be obtained through use of a special rating. It was pointed out that customers of the industry constitute a "blue ribbon" list of value in gaining assistance.

The industry is under general price controls until a tailored order for the industrial sand industry is written. Such an order may be written specifically for the industry or covering the nonmetallics group of industries. A committee to be appointed for the purpose will have a great deal of influence.

The industry is subject to the rollback to pre-Korean prices but will take the stand that normal competition is effective in holding its prices down. The industry will be able to increase prices to compensate for labor increases up to March 15, 1951.

There was much discussion of regulations governing permissible 10 percent wage increases over January 15, 1950, figures. The opinion was that the annual total payroll is governing and that wage increases may be distributed in any way. If the number of men has increased in a plant since January 15, 1950, application must be made for a proportionate allowance. Vacations and paid holidays, sickness and accident benefits are all charged against the 10 percent wage rate limitation. If a new job is created, the producer should go ahead and fix a sensible wage rate covering the job. If a raise is due a worker because his status has changed to a more important job, proof of that fact will permit deviation from the ten percent limitation. Bonuses may be continued, if given before, but they may not be increased more than 10 percent.

There was so much interest in the application of wage increases that Mr. Ahearn will put out a special report on application of the 10 percent rule. In any discussion of wages, regardless of government regulations, Mr. Ahearn advised that companies continue to bargain in good faith with the unions and not base refusal of wage increases on wage stabilization regulations exclusively.

In commenting on price controls, the general price regulation limits prices to the highest prices customers of the same class paid during the December 19, 1950, to January 25, 1951, period. A company must not buy or sell at figures over those base prices. The prices that govern are the delivered prices, quoted prices governing if no deliveries were made during the base period. Customary price differentials must be maintained. Railroad freight increases must be absorbed if a company quotes delivered prices; otherwise prices may be proportionately increased. Mr. Ahearn predicted that a series of increases in railroad freight rates is coming.

Washington Scene

Ladies at the convention were invited to hear the concluding talk on the Washington scene, which was an unprepared speech by Mr. Ahearn in which he gave his impressions on a number of matters of interest to everyone.

At the start, he said that the Washington story still is the "great debate." Appraising this subject, he said that General MacArthur came into the picture at a time when the country needed a hero, shortly after the Kefauver committee exposed the degrading side of public officials. The most important result of the MacArthur episode is that he stimulated morale, he said, and only time will tell whether his powerful appeal to the masses might prove dangerous.

General Marshall's answer to General MacArthur was touched upon, and the risks of war that might be taken should the MacArthur program be undertaken. The popular opinion in Washington is shifting to the MacArthur point of view. Secretary of State Acheson was referred to as being politically indiscreet, but he is not responsible for the removal of MacArthur. He serves as a whipping board for the administration and his resignation has been on President Truman's desk for a long time but will not be accepted.

It is Mr. Ahearn's opinion that President Truman will probably be the 1952 presidential candidate for the Democratic party and that General Eisenhower will not accept nomination from either party in that event. Senator Taft is believed to fall short of "winning" qualities, Governor Dewey symbolizes defeat, Governor Warren is on the "liberal" side and it is to be hoped that General MacArthur does not run, in the words of Mr. Ahearn.

The two most important problems facing the world today are the shortages of natural resources and surplus population. It was pointed out that the United States is not a self-contained nation, having to import iron ore, copper, aluminum, rubber, tin, chromite, manganese, tungsten, wool, zinc and lead, etc. Because of these needs, we are committed to a united world and must build an organization of nations with prestige and author-

(Continued on page 89)

EVALUATION AND DEVELOPMENT OF KILN EFFICIENCIES

Part IV. Flame characteristics for maximum heat transfer and minimum loss discussed in detail

By VICTOR J. AZBE*

HEAT EVOLUTION, through combustion in excess of 100,000 B.t.u. per cubic foot of combustion space per hour, is now easily attained. This is the equivalent of burning 5 lb. of oil or 8 lb. of coal, which is many times more than necessary in even the highest capacity rotary kilns. Assuming the open space of half of the length as combustion space, then the average rate of heat evolution is only about 20,000 B.t.u. per cu. ft. So, lack of combustion space can never be the reason for limited capacity. It is always either an insufficient amount of fuel, an insufficient amount of air, poor mixing of fuel and air, or poor utilization of the available combustion space of the kiln.

Insufficient draft is a common fault, but often when draft is increased, results become worse rather than better, either due to insufficient fuel, poor fuel-air mixing, or lack of the required time factor due to failure to utilize the combustion space properly.

Results may become worse also because heat generated is not in a form capable of being absorbed, or surface is lacking for its absorption, or it is generated where the absorption rate is already at a maximum for the prevailing conditions.

The finer the pulverization or atomization of the fuel, the quicker and the more intimate the mixing with air, and the greater the air excess, then the greater will be the rate of combustion, the shorter the flame and the higher its temperature. These are conditions which are desirable but only to a definitely limited extent. They should be obtainable, but in controllable amounts.

Flame Length

We want a "long flame" but we also want combustion to be completed well within the calcining zone, and while we desire "complete combustion" it is the incomplete combustion that gives us the necessary radiant flame. We want "high temperatures" but they harm the kiln and may harm the lime and, when high, chances are that radiation is low. We want a "high rate of combustion" but where is the surface to absorb the heat generated? We want "effectiveness of combustion space" which presents fuel injection problems to the very border of impracticability.

What is necessary is the realization of advantages and disadvantages of all, then the development of a system that will allow a suitable blending of conditions for the best possible compromise. This will be different for every kiln since different kilns vary greatly in their heat absorbing power.

Kiln diameter and ratio of diameter to length determine exposure surface. Kiln load and circumferential speed determine exposure rate and retention time. The very important factor of stone sizing, which governs surface replacement, has an important bearing on the degree to which heat may be applied and the length to which flame should extend, and so has the flame itself by virtue of its radiation characteristics. All of these are greatly modified when inserts are adopted.

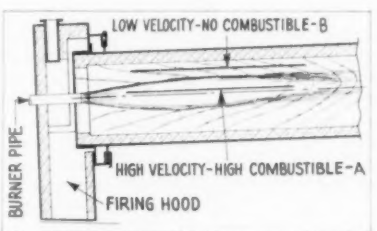


Fig. 14: Stratified flow of gases in rotary kiln

If it is just a matter of capacity, fuel economy being of relatively little importance, the burning gas stream can extend well into the preheating zone with virtually the entire kiln space acting as a combustion chamber. But kiln waste gas temperature will be 1600 deg. F. and there will be "terminal" incomplete combustion, and fuel consumption will be very high. In many such cases the burning of gases extends into the dust chamber and draft is very good because of the hot chimney, allowing increased capacity to be obtained, but at a cost, of course. Or combustion may resume in the dust chamber with seal ring or feed pipe leakage air.

If economy is desired, then combustion should be complete within the calcining zone, that is, within one-third to one-half the kiln length, one-third for longer and one-half for shorter kilns. Any CO, hydrogen or hydrocarbons that pass this point should be considered as due to incomplete combustion, even though combustion may be complete at the kiln end. Waste gases from rotary kilns are hot, due, in a considerable degree, to extension of combustion into the preheating zone.

Ordinary rotary kiln firing arrangements prevent complete combustion within the calcining zone, and tend towards extreme stratification of gas flow in the manner shown in Fig. 14. Initially the velocity of "A" stream containing the combustible is some fifty times greater than "B" stream, which is all air. This velocity effect is gradually reduced but it still extends far into the kiln. If the high velocity stream is directed onto the lime, it is retarded and spread to a great extent, but the tendency still remains to carry the combustible into the preheating zone. This stratified state of affairs becomes very evident when natural gas is the fuel and, even in rather long kilns, streaks of combustible and of unused air tend to carry through to the discharge end. In case of oil, also, if the burner points down the kiln centrally and is of narrow injection angle, and if the kiln is short, unburned compounds will arrive at the discharge surrounded by a stream of necessary but unused air.

There is an interchange between "A" and "B." The "B" stream, so to speak, supplies the air to the combustible of the "A" stream gradually, so heat development is not too sudden and is prolonged down the kiln length. This is offset because this interchange, after initial turbulence, soon slows down and causes combustion to terminate too far back in the kiln. Where there is a scale ring, its projecting nubbins tend to break up the stratifications; thus in a way they help, but a bit too early. The intimate mixing should take place farther back, but unfortunately by then the turbulent state has quieted down.

Distributing the Flame

There are two alternative solutions. Either the gases should, by some means, be thoroughly mixed at the end of the calcining zone so as to ter-

*Azbe Corp., St. Louis, Mo.

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minate the combustion process (as by segmental arrangements), or they should pass down the kiln on an even front of sufficient turbulence to complete combustion within the calcining zone. The latter would be possible if the fuel injection were distributed over the kiln cross section and the forcing effect of the primary air stream were eliminated.

In this it should be remembered that almost the prime requirement in rotary kiln operation is the creation of a flame of radiant characteristics, which is not necessarily a flame of high temperature. For this purpose, combustion space has a value, while ordinarily combustion space is only very imperfectly utilized. When imperfectly utilized, the flame must be of much higher temperature for any given kiln capacity.

At this point it behooves us to consider the mechanics of the combustion process. There is the matter of the burning of the volatile hydrocarbons and of the fixed carbon. In the case of hydrocarbons, there are two entirely distinct possibilities. The preferred one involves the cracking of the gases, principally that done by hydroxylation.

In the more favorable case of cracking, the hydrocarbon, (for example methane, CH_4, the leanest in carbon content), when burned in a deficiency of air, will crack or decompose into carbon, C, and hydrogen, H_2. The carbon is of infinitely fine division, like smoke, and has very high heat radiating power, but being solid it has a low combustion rate. By contrast the hydrogen has a high rate of flame propagation, i.e., a very rapid combustion rate. In the presence of oxygen, it is hydrogen that will burn first and the carbon, small as it may be, being solid, will burn more slowly. The carbon will be receiving heat from the burning hydrogen and so radiate in a good measure both its own heat and that of the hydrogen, thus aiding the relatively weak H_2O heat radiating powers.

If hydroxylation is favored, then the hydrocarbon will pass through various stages to CO, H_2 and eventually CO_2 and H_2O, with never any carbon being liberated. Radiation in this case will be limited and will in the main be only from certain specific narrow bands of the triatomic CO_2 and H_2O spectra.

In the case of rotary kilns fired with pulverized coal, this latter is precisely what does occur. The volatile of the coal carries about 30 percent of the coal heat value and the coal is ordinarily injected with 30 percent of primary air. Before any of the fixed carbon burns, the volatile is all evolved within a highly turbulent stream of adequate oxygen content for its complete combustion. Heat is promptly developed but very little benefit is obtained from its possible radiant characteristics. From this, one would conclude that air is not the proper injection medium, or at least that primary air should be limited. The use of waste gases should be more advantageous, for then the volatile would crack and so have to pass through the free carbon stage.

The perfect example of desirable coal flame was that of gas producers of years past, but they were not very successful because air was not introduced sufficiently and combustion extended too far. That results were not better was also due to the fact that gas producers then were heat wasting, trouble making, erratic in performance and of too low coal gasifying capacity for the high productions desired. Now the reliance is more on pulverized coal particles but, compared to the cracked carbon particle, they are immense in size, comparatively few in number and of low total surface, and it is the surface that is needed.

The devolatilized carbon particle burning rate will depend on the size of particle, its destiny (which is determined by the amount of volatile matter and swelling tendency), and on percentage of excess air present in the atmosphere surrounding the stagnant gas film immediately adjacent to the particle. Rate of combustion is proportional to the surface area or the square of the radius of the particle; that is, virtually proportional to the size of the particle. A particle of double a given mesh size will require about quadruple the time for the original particle.

Excess air has a tremendous effect on rate of combustion. At 25 percent excess air the rate is twice that at 5 percent excess air. The rate, of course, will rapidly reduce as the air is used up, and simultaneously, the area of the particle as well as the general kiln turbulence will reduce, all indicating necessity for an artificial means of re-creating turbulence at the end of the combustion path.

Turbulence is not a factor if the original mixture is uniform, but in rotary kilns original mixtures are never uniform. In the injecting stream the oxygen is used up in the burning of the volatile matter and thereafter combustion will be at the rate that oxygen finds its way from the surrounding envelope to the coal stream, in which it is aided by artificially created turbulence, gaseous diffusion and thermal convection.

In short, premixing of fuel with air reduces the possibilities of luminosity, as does excess air and turbulence. Slow burner velocities and diffusion mixing increase luminosity but the amount of fuel burned is greatly reduced unless combustion space is more fully utilized. So it becomes a matter of a greater number of burners of low velocity, not using air as the injection medium, the gases traveling down the kiln line on a relatively even front of no more than the necessary artificially created turbulence to complete combustion evenly at the approximate end of the calcining zone, where the natural diffusion mixing can be aided by radial inserts.

Burners

At present, the single burner systems, operated at very high velocity of injection into a straight open chamber of relatively large diameter, such as the rotary kiln presents, are not right. In the case of the rotary kiln there is too much similarity to boiler practice. Desired conditions are entirely different. In boilers most of the heat is absorbed by convection; in kilns, by radiation. Boilers are deficient in combustion space; kilns have ample space. In boilers, superfine grinding of coal is desirable, whereas in kilns it may not be necessary if other desired conditions are satisfied.

Except in the case of the refractory dolomite or cement kiln where there is a clinkering zone demanding very high temperatures quickly, the system of combustion in rotary kilns should lend itself toward development of a long, mild high temperature peak, rather than a short one of high temperature. This is a condition attained by delayed combustion which invariably creates a more luminous state and in general is less troublesome.

There is the matter of excess oxygen and the question of whether it is desirable or not. Excess air reduces luminosity, but assures combustion to be completed in the desired portion of the kiln length. If a high and sudden temperature peak is wanted, then some excess air would be desired. In the process of dead burning, it may improve kiln efficiency as it would aid in developing the heat at the point most wanted. However, in general in the case of lime kilns proper, combustion space utilization, fuel introduction and the artificially created state of mixing should be such that virtually no excess air is needed, as that leads to the highest degree of possible radiant power and a lower stack loss.

With the improvement of the rotary kiln, high air preheating is obtainable. This tends to speed ignition greatly and moves the high temperature peak more toward the point where lime, in the surface layer at least, is all lime at high temperature and of less heat absorbing power. This in itself demands control of combustion conditions beyond that commonly practiced at the present.

To aid combustion and improve luminosity, the coal should be predried, but not in a manner that causes the water vapor to pass through the kiln. Such vapor tends to oxidize the carbon in accordance with the reaction $C + H_2O = CO + H_2$ which is non-luminous, tending to give a dead flame. For predrying, rather than

using the very valuable preheated air from the kiln hood, waste gases from the rear of the kiln should be used and then wasted, carrying along excess H_2O from the dried coal.

There should be a system of twin burners, the main one for far projection of the fuel by means of spent gas, to operate continuously and unchangingly. The second burner would be intended for short projection of intense flame created with an excess of hot air direct from the cooler. It is only this one, playing on the lime or clinker surface, that would be regulated to control the final burn.

The aim of this system is to avoid the upsets that the kiln suffers when its speed is varied and the general fuel stream is changed. It calls only for regulation of an auxiliary burner and constant kiln speed and constant main fuel injection. In respect to automatic control, it should be of the draft, from a reliable oxygen recorder system type, and one that would take care of the variations of air supply which the auxiliary burner would introduce.

Rotary Kiln Heat Transfer

There is "radiant transmission" of heat from the flame that may be either from the minute carbon particles of the dissociated hydrocarbon gases, from the much larger coke particles of the pulverized coal, from the cloud of ash and lime dust floating along at the temperature of the stream, or from discontinuous radiations from the triatomic gases CO_2 and H_2O.

Then there is heat transfer by either natural or forced convection, inducing surface conductance, this being conduction through the thin stagnant film of gas adjacent to the heat absorbing surface, the insulating resistance of which is overcome by radiant heat to a large extent.

Finally there is heat exchange by conduction between solids of different temperature in contact with each other, or dissemination of heat from the surface through the solid, a matter of thermal diffusibility being a factor of conductivity and heat capacity.

That heat is transferred in rotary kilns in this manner is well known generally, but very little in its details, far less for example than in the case of the boiler and other stationary furnaces, partially because these were subjected to more intense study and partially because they present a far simpler problem.

In the case of ordinary furnaces the heat-receiving surface is relatively fixed in respect to its extent and its temperature, so the flame and its characteristics are essentially the only element of variation. In the case of rotary kilns this is not so; the heat-receiving mass can vary greatly in heat-receiving capacity and may do so within short periods of time. Thus we would say the problem here

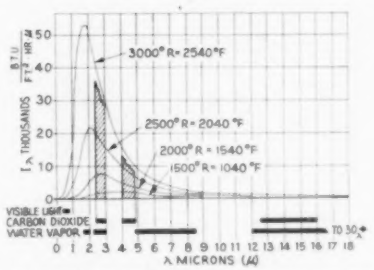

Fig. 15: Heat radiation spectrum and radiant intensity of various wave lengths

is two-fold, if not manifold.

Some heat of the gas is transferred by convection but, as a convection heat transfer apparatus, the rotary is of extremely low efficiency. There is just not enough active surface. Most heat is transferred by radiation, but there is a difference as to whether radiation is from carbon of the dissociated components of the volatile matter, from the burning coke particle of the pulverized coal, from the CO_2 and H_2O portions of the products of combustion, or from the dust (that is, the floating ash and lime dust).

Electromagnetic waves of different lengths are the cause of radiant heat transfer phenomena. As presented by Fig. 15, those of importance in heat transfer ranges are between .4 to 30 microns in length. As shown, visible light occupies a very narrow portion of this range, with most of the radiant power being beyond in the so-called infrared region. There are, of course, much shorter radiations as well as much longer.

The small portion of the spectrum that the visible light occupies indicates that luminosity and radiant power are not necessarily one and the same and that most of the heat radiations are outside of the light range. Still, luminosity is an important feature, since it is indicative of a flowing carbon particle which has the highest power for radiant transmission.

When a flame is called luminous it is ordinarily accepted that the luminosity has its origin in the carbon particle, originating from dissociation of the hydrocarbons, rather than from the coke particle of the pulverized coal stream. The difference in the two particles, that is, carbon from dissociation of natural gas or volatile products of the pulverized coal and of the coke particle from pulverized coal, is due to their respective size and the relationship of this size to the wave length of heat radiation.

The carbon particle is about one-quarter of a micron in size while the coke particle is about 50 or 75 microns. Even much of the ash of the pulverized coal particle will be in excess of 10 microns, while most of the heat radiation waves are shorter than 10 microns. This results in an important difference: the carbon particle is relatively transparent to heat radiation, while the coke and the ash particles are opaque, and, in a dense stream, obstruct heat penetration.

The curves of Fig. 15 represent continuous spectra, which can only have origin in a solid body. Radiations from carbon, ash, and the wall are of such continuous spectra, their intensity mounting very rapidly with increase of temperature. However, only the carbon particle of the hydrocarbon will have the high emissivity to project the full energy if not interfered with. "Emissivity factor" for coke will be lower, for ash particles still less.

In all this we still deal with radiations from solids of which Fig. 16 is further illustrative. The curves are based on the Stephan-Boltzman radiation law.

$$G = K\left[\frac{(T_1)^4}{1000} - \frac{(T_2)^4}{1000}\right] E$$

Where:

G = heat transmitted, B.t.u. / sq. ft./hr.
K = radiation constant = 1723
T_1 = temperature of hot body, deg. absolute (deg. F. + 460)
T_2 = temperature of cool body, deg. absolute (deg. F. + 460)
E = emissivity factor

The graph is calculated with an emissivity factor of 100 percent. To obtain the actual heat transfer rate multiply by the respective emissivity, which in the case of cracked carbon may be 95 percent, but in the case of pulverized coal flame is only about 40 to 60 percent. As combustion tends to completion it will continually decrease, and with close to transparent flames it may be but 10 percent.

With respect to gases, while all are heat carriers, only CO_2, H_2O, SO_2, and the hydrocarbon gases are heat radiators of any practical consequence, but this in a discontinuous spectrum, of which the various band locations for CO_2 and H_2O are also shown shaded in Fig. 15. Of these bands there are three for carbon dioxide and four for water vapor, their location indicated at the bottom of the figure.

To what extent CO_2 radiates at 3000 deg. F. in proportion to a solid body is indicated by the area of shaded extensions compared to the total area below the upper curve, which would be radiation intensity of a solid at 100 percent emissivity. Even this amount, however, is reduced because solids interfere with gaseous radiations and gases absorb radiations of each other and of solids.

The relative feebleness of gaseous radiation is further demonstrated by Fig. 16 in which the amount for a 500 deg. F. temperature difference is shown in dotted lines. This is for gases of an ordinarily operated rotary kiln containing by volume 27.35 percent CO_2 and 9.34 percent H_2O on

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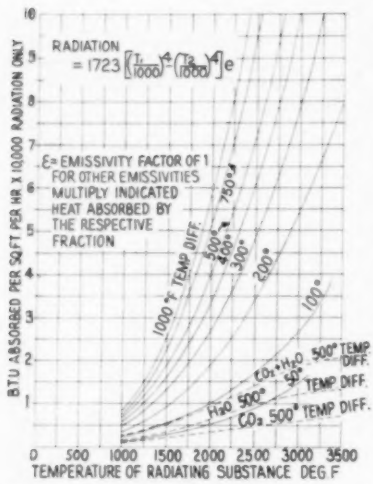

Fig. 16: Heat transfer by radiation for various temperatures of radiating and heat absorbing surfaces

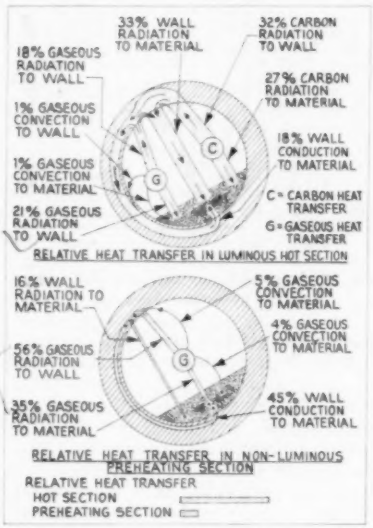

Fig. 17: Relative heat transfer in rotary kilns

the wet basis. At 2500 deg. F. the combined radiation of CO_2 and H_2O is 14,000 B.t.u. while for carbon radiation it is 73,000 B.t.u., the gaseous radiation portion thus being less than 20 percent.

As this is an extremely important point and very little information is ever issued on this, we prepared Fig. 17 from some experimental data developed by Hans Gygi. It was developed for cement kilns but to a fair extent would apply to lime kilns of the rotary type as well. The upper figure is for the luminous hot section of the kiln, the lower for the non-luminous preheating section. The contrast is startling but is about the same contrast that we find for these conditions in Fig. 15 and 16. In the case of the upper figure, temperatures are high and all radiations very powerful. In addition there is the carbon radiation which exceeds the gaseous radiations. Convectional heat transfer is an insignificant portion of the total.

In the lower figure representing the preheating zone, temperature is low and so gaseous radiation is far lower. As combustion has been completed there is no carbon radiation. Convectional heat transfer plays a more important role and a much larger amount of heat is transferred by conduction through the wall. The difference between solid and gaseous radiation is shown when pulverized coal-fired kilns are changed to natural gas firing. Terminal temperature rises, fuel consumption increases, and capacity decreases because the radiating solid is lacking when natural gas is injected in a manner not conducive to its cracking.

This in a way proves that the ordinary type of burner used on rotary kilns is relatively ineffective as a luminous flame burner. Coal now is usually fed with the gas to act as a carburizing agent, which helps greatly, but the fact that the burner with straight gas does not do better proves that coal alone, to a lesser degree, is still relatively inefficient as a luminous flame burner. Since the rotary is dependent on radiant heat transfer to the extent of at least 80 percent, it makes such relative transmission powers very important from the practical viewpoint.

However, there are other considerations. Flames of very high radiant power also have a high absorbing power and while even to a degree transparent, they still block off radiation from the walls to the material. Thus, while a luminous flame is desirable, there are limits in the rotary kiln but less so than in ordinary furnaces because the wall is repeatedly being turned under, bringing overheated surfaces into new positions at the edges of the flame and into contact with the lime for periods at times as short as 35 sec. It is unfortunate that, due to the material classifying tendency of the ordinary rotary kiln, the coarser components of the bed that were exposed to the high heat of the flame tend also to come in contact with the wall.

To increase heat transfer it is necessary either to increase temperature, temperature difference, luminosity or surface area through inserts. In this, temperature is an exceedingly important factor due to the fourth power law. Otherwise there should be an order, flame the hottest, then the wall and finally the material and, within this, the greater the difference the greater the thermal flux at the respective degree of emissivity that may be obtained, all of which can be increased proportionately by increase of surface.

Limestone Meeting

A MEETING FOR LIMESTONE PRODUCERS was held at the College of Agriculture, University of Missouri, Columbia, Mo., June 11, 1951. The main objective of the meeting was to give producers an opportunity to see how samples of agricultural limestone are tested—both for fineness and calcium carbonate equivalent. Also, the electrospectrographic laboratory, in which trace elements of rock samples are determined, was visited.

Amended MO-7 Order

DEFENSE MINERALS ADMINISTRATION'S amendment to the MO-7 order, pertaining to serialization of mines, smelters and processing plants, became effective May 10, 1951, and supersedes the earlier edition.

Allocation assistance under the amended order will be given only to producers who have been granted serial numbers as provided in the order. The deadline date for application for serialization was June 30, 1951, but producers commencing operations subsequent to June 30 are not prohibited from making application at a later date.

"Small" operators, or those producing or processing 50 tons or less of crude ore per week, in applying for a serial number, may use either DMA Form MF-100, or apply by letter. If Form MF-100 is used, only four of the 18 questions need be answered—Nos. 1, 3, 10 and 16. If application is made by letter, the following information must be given:

a. Kind of material produced or processed, and by-products, if any.

b. Location of operations: Give county, state, township, section, range, mining district and distance to nearest town and shipping point.

c. Number and types of labor employed.

d. Quantity and kind of product mined or processed and sold during 1948, 1949, 1950 and present monthly average.

The applications, whether by letter or through the use of Form MF-100, should be filed in quadruplicate with the Defense Minerals Administration, Department of the Interior, Washington 25, D. C.

Any producer granted serialization under the provisions of the order is required to keep such records and submit such reports as the Defense Minerals Administration shall require. Any producer affected by any provision or by any action taken thereunder, may file a request for adjustment or exception upon the ground that such provision or action works an undue or exceptional hardship on him, not suffered generally by others in the same industry, or that its enforcement against him would not be in the interest of the national defense or in the public interest. Each request shall be in writing, in duplicate, and shall set forth all pertinent facts, the nature of the relief sought, and the justification therefor.

Macco Corp. plant at Rosemond, Calif. The two gyratory screens are in the "dog house" on top of the silo

Gyratory Screen Developed for Sizing Fine Materials

SCREENING OF FINE MATERIAL in the rock products industries has been one of the problems that has been solved with indifferent success. On the West Coast considerable inventive ability has been used in an effort to help those producers who have fine screening problems. One such screen that is finding considerable acceptance in the Southwest is a gyratory screen developed by the Southwestern Engineering Corp., Los Angeles, Calif. After seeing the laboratory and commercial machine in operation under laboratory conditions we decided to go to a plant located inside the Mojave desert and see it first hand. The plant where the screens are installed is a nonmetallic mineral operation which prepares clay for well drilling mud. The plant is owned and operated by the Macco Corp., Paramount, Calif., a suburb of Los Angeles. The Macco Corp. has an affiliate company, the Brisbane Rock Co., which in turn has an operation located near South San Francisco. Macco is also quite active in the construction field, especially in foreign countries and another affiliate company recently signed a highway construction contract in Bolivia.

The plant that produces the raw material from which well drill mud is later made is located at Rosemond, Calif., some 14 miles south of Mojave. Mojave is 107 miles north of Los Angeles. The area is desert in nature and it is not difficult to deliver a dry material to the processing plant. The clay is ground in two dry pans, one an American and the other a product of the Eagle Iron Works.

Material Processed

The clay or alluvial silt is ground to minus 8 mesh and at that fineness the material tends to ball up or cling together into small globules. It also packs quite readily. Before installing the Southwestern gyratory screen, rotary screens and three or four different makes of conventional vibrating screens were tried. The company now has two gyratory screens in operation in series. The screens have a rated capacity of 25 tons per hour.

Experimental gyratory screen for putting a thick slurry through a minus 200-mesh screen

These are overloaded and are delivering between 70 and 80 tons per hour. Each screen has a 5-hp. motor. It would take, the operators pointed out, 6 to 8 times the present screen area if the formerly used screens were still in operation. The alluvial clay has a moisture content of about 8 percent in winter. Twelve percent is the highest recorded. In summer the material has 1 percent moisture and as such appears to be bone dry. No drying equipment is in the plant and any moisture removals must occur from climatic sources.

Screening Action

The screens used at Rosemond have a single deck that is circular and is 4 ft. in diameter. The screens have a metal binding at the outer edge and a similar binding around a small hole in the center. This circular screen is mounted horizontally in a steel and dusttight housing. The wire is about 6 in. from the top of the housing. The feed is towards the center of the wire cloth. A gyratory motion is imparted to the wire by a mechanism enclosed in the lower housing. The material on the screen moves outward somewhat tangentially, the oversize draining off through peripheral spouts. The action of the screen is such that the material tends to roll on the cloth rather than bounce.

H. C. Parker, superintendent at Rosemond, was quite enthusiastic about the screens' performance. He pointed out that the screens, besides having a high capacity, took up only about half the room one would ordinarily assign to screens of similar capacity and that they were easy to install and to repair. He also said that the screen cloths lasted longer and did not blind so readily. Where the material first hits the screen a ring forms that tends to blind, but the balance of the cloth remains open. The area of this ring would only represent a small percentage of the total area. However, Mr. Parker pointed out that when the screen shuts down at noon and remains still a few minutes, the first few gyrations of the deck clear this ring of any material. Wire brushing of the cloth is not practiced.

A third Southwestern gyratory screen is at the Rosemond property and was being used for experimental purposes. This screen was being used in an effort to remove any wind-blown sand from the drilling fluid and water was added to the clay and a thick pulp made. This pulp weighed from 90 to 92 lb. per cu. ft., which was screened through a 200-mesh screen at the rate of 25 g.p.m. The fine material was then run into the small ponds to air dry, after which it was intended to reprocess the material.

Personnel

The offices of the Macco Corp. are in Paramount, Calif. John Robinson is manager and A. D. Rhodes is plant engineer of the Rosemond operation.

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General view of the Campbell Limestone Co. quarry near Pacolet, N. C. Dimension stone was originally quarried here. Face will eventually be 110 ft. high in benches of about 18 ft.

PLANT DESIGNED FOR LOW LABOR COST

Campbell Limestone Co. granite plant uses surge pile, large platform scale, interlocked motors and offers many details for efficient production

By WALTER B. LENHART

ONE OF THE NEATEST and most substantially built crushed stone plants we have encountered for several years went into operation recently in South Carolina. The new operation is that of the Campbell Limestone Co., home office of which is in Knoxville, Tenn. The company also has a 600 t.p.h. crushed granite operation at Liberty, S. C., and a limestone plant at Gaffney, S. C. The new addition to the company's productive capacity is located near Pacolet, S. C., about 9 miles southeast of Spartansburg; it is a crushed granite operation.

The Pacolet plant is of steel and concrete construction throughout and does not have a piece of wood in it. It is a straight-in-line operation and uses belt conveyors throughout. The plant is a very excellent example of a well designed and constructed plant which has only two screens, with the exception of a final rinsing screen, and two crushers. These are assembled in such a fashion as to result in a relatively large capacity plant that can be operated at high efficiency with few men. Several features of the new plant set it apart from most crushed granite operations, for instance, the crushed granite aggregates are washed at the second screen and given a rinse prior to delivering the rock to the final loading bins. A second example: a surge pile is featured but it differs from more conventional practice in that all material going to the pile has passed the primary and secondary crushers, the only two crushers in the plant.

Platform Scale

A third feature that sets this plant apart from all plants inspected over the past years is the use of a truck scale with a platform 90 ft. long. This platform is under the loading silos, permitting a truck loading from any silo to be weighed while being loaded. This is indeed a novel stunt and the adaptation of a scale platform of this length—probably the longest platform in the rock products industry—will be watched with interest.

The general design and layout of the plant was made by George Carow, chief engineer of Campbell Limestone Co., who also acted as construction superintendent. E. Lee Heidenreich, Jr., consulting engineer, did the detailed engineering work. Before joining the staff of Campbell Limestone, Mr. Carow was Eastern sales manager for Hewitt-Robins, Inc.

Protective Features

All motors in the plant with the exception of the two larger size motors on the crushers are dustproof and waterproof and operate without cover.

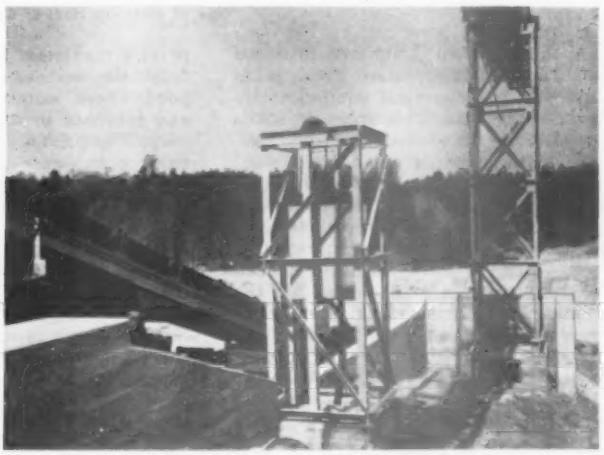
These five concrete silos hold finished and sized material; tripper can be seen over bin at left. The 90-ft. platform scale is under the bins

Elevated conveyors will build up stockpiles of 1¼-in., ¾-in. and ½-in. material over the reclaiming tunnel. Three conveyors are in the gallery

Primary screening station: a 6- x 16-ft., 3-deck screen operating dry is used. Cone crusher in right foreground receives oversize and delivers it to surge pile

Second screening station: a 6- x 16-ft. 3-deck screen operating wet is used. Waste water is flumed to small tower at right. Here screen is being by-passed to make crusher run

Rinsing screen (5 x 10 ft.) is in this tower. Waste water flume is at right here also. Note by-pass onto belt at right if washed stone is not wanted



Inclined take-up pulleys for constant belt tension are used. These two views of the take-up on No. 1 belt clearly illustrate the arrangement of counterweight, pulley, cable and belt. Take-up pulley runners are on a slope of 20 deg.

C. H. Talley, quarry foreman

Two trucks are operated at present to haul from the 2-cu. yd. shovel to the primary crusher

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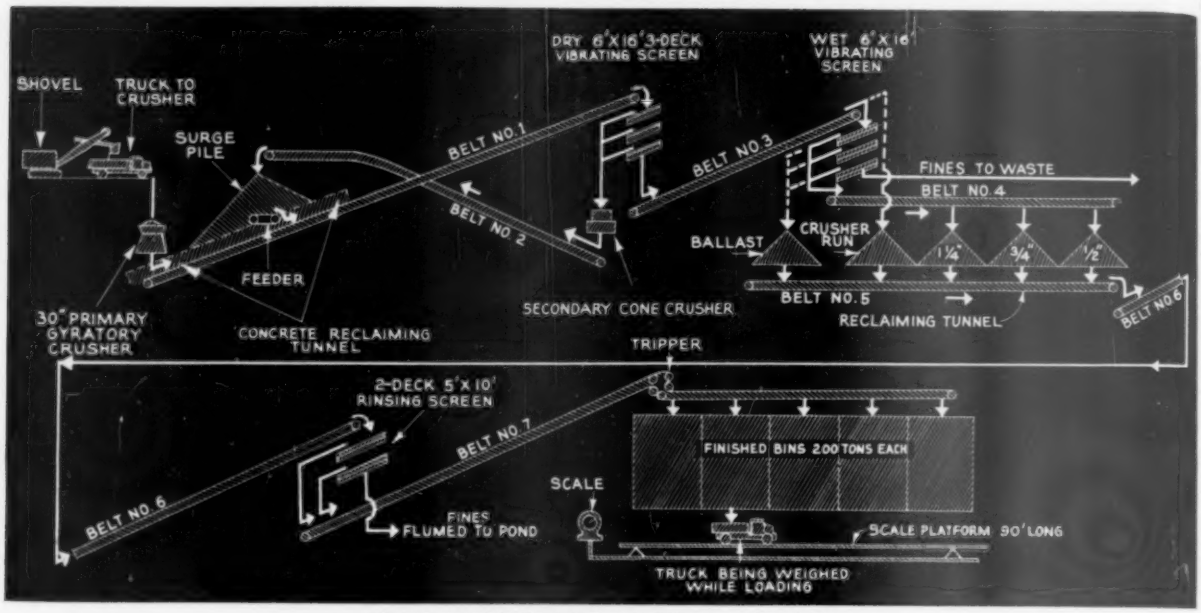


Flow of materials through Campbell Limestone Co. plant

All the conveyor belts are provided with automatic, constant-stress take-ups with the electrical equipment interlocked; if one unit stops or stalls an alarm is sounded and all units preceding the trouble come to a stop. Pushbutton controls are used throughout. All chutes and transfer points are provided with replaceable liners and are bolted in place with counter-sunk bolt heads. In most instances a dead bed of rock is maintained in the chutes (or at transfer points) so that rock impinges on rock. The dead bed is maintained by means of simple cross riffles in the chutes.

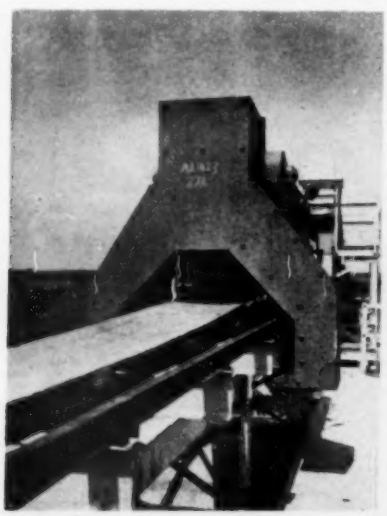
The plant is designed for a capacity of 450 t.p.h. at the primary end and an average of 200 t.p.h. at the finish end, with 250 t.p.h. at this point a maximum figure. Wash water from the screens goes to a tailing pond where water will be reclaimed and returned to the system, if necessary. The primary source of water is from a two-acre artificial lake. The lake is fed by a spring-fed brook with the water pumped to the plant. The pumps deliver 350 g.p.m. each.

The site of the new plant is on the side of a gently sloping area that is entirely underlaid with granite of excellent quality. A few feet of overburden overlays the granite and a considerable area was dozed back and subsequent rains washed the surface of the deposit, leaving it practically clean. Quarrying has been started at a point near the primary crusher and, as the work extends away from this starting point, the face of the quarry will eventually be about 110 ft. high. However, it is the present intention to quarry using 18-ft. high benches. Two 11-cu. yd. capacity rear-dump trucks are being used at the present, and later a third truck will be added.

Layout-Flow

The plant, starting with the 30-in. primary gyratory crusher, extends uphill slightly with all units assembled in a straight line. The first belt conveyor is a 36-in. unit which delivers to a dry 6- x 16-ft. three-deck vibrating screen. Oversize from any of the decks of the screen can be dropped to a No. 1260 Hydrocone crusher. The crushed rock from the Hydrocone is then first elevated by means of a 24-in. conveyor and then conveyed horizontally, dumping its load of crushed rock at a point near the primary crusher and over a reclaiming tunnel. This provides the surge pile. A heavy-duty electric vibrating feeder returns the surge rock to the primary belt. At the outboard end of the horizontal belt used for building the surge pile, it is 40 ft. to the top of the reclaiming tunnel, and 4000 to 5000 tons of storage is anticipated. A bulldozer is available for helping in the reclaiming operation if need be.

The throughs from the dry primary screen are elevated and conveyed on a 24-in. conveyor to a 3-deck, wet 6- x 16-ft. vibrating screen that is mounted in a steel tower structure. Provisions are made here so that crusher-run can by-pass the screen and dump directly to ground storage over a reclaiming tunnel. This pile is immediately alongside the main structure. On the opposite side of the steel structure provisions are made to ground-



Close-up of tripping device over the concrete shipping bins

Wagon drill in quarry drills 18-ft. holes with tungsten carbide bits, operating wet

store ballast or any other special size stone over the same reclaiming tunnel belt. The 3-deck screen will make, in addition to ballast or special stone, three sizes of crushed granite: 1¼ in., ¾ in. and ½ in., and three 18-in. offbearing conveyors from the screen deliver their rock to ground storage. Reclaiming to the belt in the tunnel will be through conventional clamshell type gates.

Adequate water sprays are over the vibrating screen and the fines are sent to the retaining pond. The reclaiming tunnel is open at both ends, and like the one under the surge pile is of reinforced concrete of substantial dimensions. The pillars (three in number) that carry the belt conveyor that builds up the three previously mentioned stockpiled materials (1¼ in., ¾ in., ½ in.) are on 60-ft. centers and are up to 40 ft. high. They are of monolithic reinforced concrete, rectangular in cross section, and have ample strength to withstand any side thrusts due to uneven drawdown in the stockpiles.

The 24-in. flat-running belt in the reclaiming tunnel unloads to an inclined 24-in. belt serving a 2-deck, wet 5- x 10-ft. rinsing screen. Fines along with wash water go to the storage pond and the washed rock is elevated and conveyed, then discharged to one of five circular reinforced concrete finish bins by means of a Link-Belt tripper. Each bin has a capacity of 200 tons; they are arranged in a straight line and straddle a driveway, the roadbed of which is the 90-ft. long scale platform. The use of five bins means that blended stone can be sent to one or more of the silos from the outside storage system if desired. Shipments will also be made by rail and provisions have been made to install a flat-running belt conveyor on the outside of the storage silos. This will in turn load the cars. Thus, here

Reclaiming gate in tunnel. The rectangular steel hopper in center is designed to prevent rock from falling directly to the belt

Second 6- x 16-ft. screen (wet) is located in steel tower in center. Conveyor behind it builds stockpiles of finished material

too, if desired, a blended stone can be shipped. The Southern Railroad serves the plant.

Loading in the quarry is by means of a 2-cu. yd. No. 802 Lima diesel-driven shovel. Three wagon drills are in use for primary drilling, and tungsten carbide bits are used. The drills operate dry. Two air compressors are available which are mounted on skids for portability. Some secondary drilling may be necessary although the rock fragments reasonably well. The inspection of the plant was made the day it went into operation, and the pictures of the truck at the primary crusher are of the third load of rock to go into that unit. Thus it will be seen that the operations in the quarry are in the trial stages and blasting techniques subject to experiment and to subsequent changes. The quarry was formerly a source of dimension stone and was operated on a relatively small scale.

Personnel

R. S. Campbell, Jr., is president of Campbell Limestone Co. He spends much of his time at Gaffney and Liberty, S. C. Frank E. Crecelius is plant manager, C. H. Talley is quarry foreman, and M. Gross is office manager.

Officers of Campbell Limestone Co. (left to right): Frank E. Crecelius, superintendent, George Carow, chief engineer, and R. S. Campbell, Jr., president

EXPANDING PERLITE IN ROTARY KILN

Jacketed kiln at New Orleans plant permits preheating and controlled expansion of ore

ONE OF THE NEATEST, most compact and efficient perlite expanding plants that we have had the pleasure of inspecting is that operated by Alatex Construction Service, Inc., New Orleans, La. The new plant went into operation during July, 1950, and has been delivering an expanded perlite that is well above specification requirements.

Furnace Details

The furnace used is evidently the secret of this plant's success. It is a rotary-type furnace only 26 ft. long and consists of three concentric tubes. The outer tube is constructed of ½-in. mild steel and serves as a protection for the two inner tubes which are both made of Inconel metal. This metal is highly resistant to distortion due to high temperatures. The metal is a product of the International Nickel Co. The ore is preheated in that space between the two Inconel tubes and makes use of the heat radiated through the inner or fire tube. There is no firebrick lining in the furnace, yet expansion of perlite has been going on in this furnace since it started without replacements. The furnace is a packaged plant and was made by The Perlite Corp., Tempe, Ariz., and Allentown, Penn.

Natural gas is used for fuel and temperature control is effected by a Leeds & Northrup Micromax unit. By means of this device, preset temperatures within the furnace are automatically maintained. With any slight change of temperature in the furnace, the Micromax functions to adjust the air and gas volumes to bring about the temperature desired.

The ore is fed to the furnace at the end opposite the burners. This portion of the furnace could also be considered the discharge end. The finely ground ore then travels through the preheating zone to a point near the opposite end where the burner is located. Here lifters pick up the preheated ore and drop it into the hot zone where quick expansion of the perlite takes place.

Officers and personnel of Alatex: left to right, Lewis Lloyd, vice-president, John E. Meeks, engineer, and R. L. Belden, manager, Perlite Div.

Perlite Ore

Crude perlite is purchased from the Great Lakes Carbon Co., Soccoro, N. M., and is shipped to the New Orleans expanding plant in box cars. The material is all minus 12 mesh with 5 percent plus 16 mesh. It is a glassy sand, gray to white in color, and has been accurately sized at the point of shipping. The car is unloaded at the plant to one of several bins or stalls by means of a Hyster scoop truck that dumps through grizzlies over the stalls. The floors of these bins are at the same floor elevation as the main plant. It takes about six

Packing finished material in 2-wall paper bags on a single-tube packer

Temperature of the furnace is controlled and recorded by this unit

hours to unload a carload of crude perlite.

The rotary furnace is served by a steel hopper that holds three tons of raw perlite. This bin is filled by the Hyster scoop lift unit and, once filled, the supply runs the furnace about three hours. The crude perlite is fed to the furnace by a Syntron feeder. The furnace is driven through a Reeves speed control unit by a 1-hp. motor.

The natural gas burner, mounted at one end of the kiln, fires directly into the inner Inconel tube or liner. At this point the preheated ore drops into the flame. This sudden change in temperature changes the volume by a ratio of about 10:1. That is, one cubic foot of raw perlite is expanded to a volume of about ten cubic feet. At the same time the perlite becomes snow white in color. The amount of expansion and the character of the resulting material is dependent on the temperature, preheating, type of ore used, and other factors. Fuel costs 50 cents per ton of crude perlite treated.

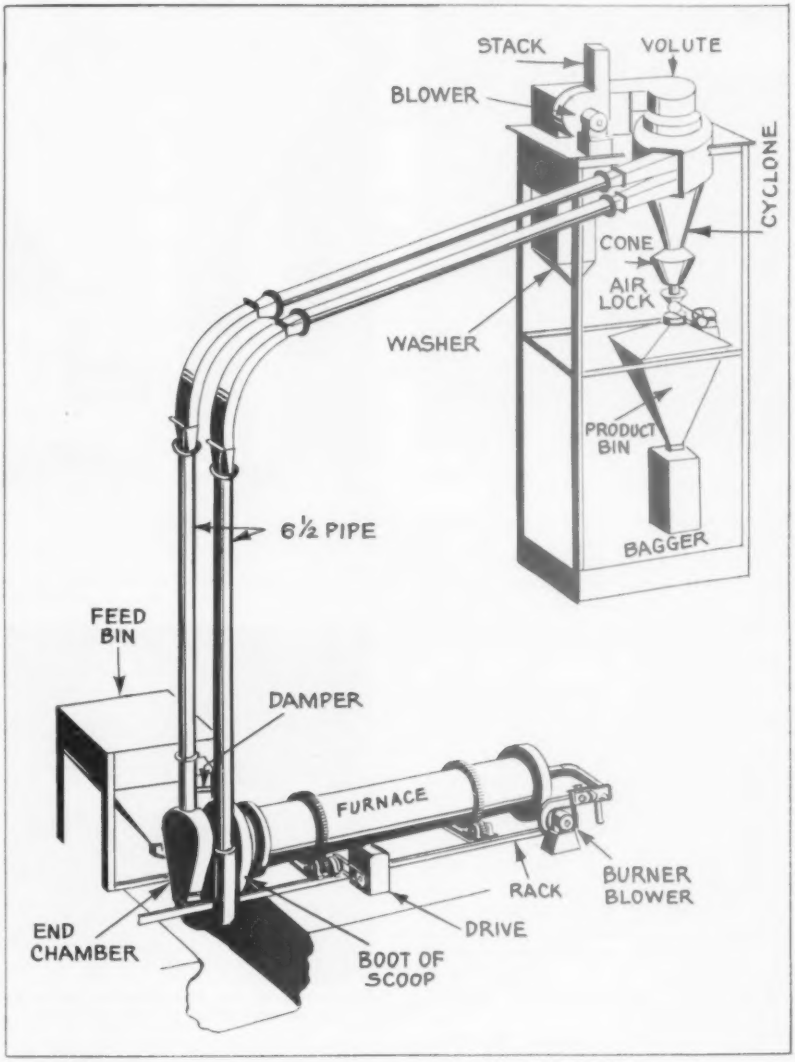
The expanded material is carried into the end chamber by the combustion gases where it is sucked up into an air conveyor pipe. This pipe serves to cool the perlite from about 1000 deg. F. to about 200 deg. F. and to transport it to the cyclone directly over the bagging machine. The cyclone precipitates about 99 percent of the finished material and deposits it through an air lock or rotary valve into the product bin. Only one grade of perlite is made at a given time.

The exhaust gases from the cyclone are passed through a spray washer which removes most of the remaining one percent so that practically no dust escapes to the atmosphere. The collection system was made by Buell Engineering Corp. and is a very efficient installation. The line cut will give the essential points of the plant and dust collecting system. It will be noted that the dust collection units are mounted on the roof of the plant.

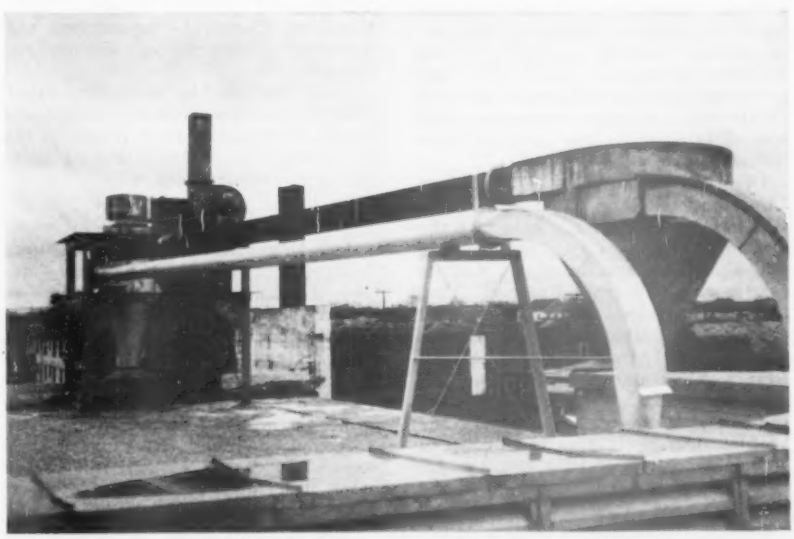
Finished Product

For the most part the perlite is sold in competition with sand for use in interior plastering. By its use a weight saving up to 90 percent is effected. Alatex perlite, because of its uniformity, light weight, acoustical properties, workability, and crack resistance is finding a ready acceptance in the markets served by the company. The finished perlite is bagged by a single-tube St. Regis packer. Two-walled paper bags are used.

Alatex Construction Service includes modern facilities for production of concrete masonry units. A second large and growing use for perlite is as a concrete aggregate and Alatex perlite roof and floor slabs are going into a large number of public

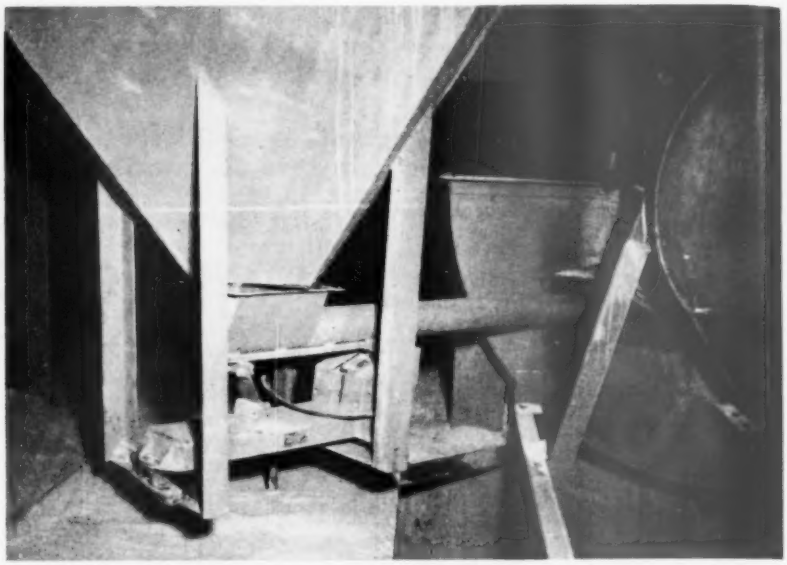


Simplified drawing of the expanding furnace and its associated equipment



Pipe in foreground delivers the expanded perlite to the dust collecting system

Scoop lift truck loading the 3-ton capacity raw material feed hopper



Raw perlite is dumped into the hopper at left, from which it is fed by a small feeder to the expanding furnace at right

and privately owned buildings in New Orleans.

The plant has a capacity of 67 bags per hour. Each bag contains four cubic feet of material and weighs from 28 to 32 lb. A typical screen analysis of the expanded material is as follows:

Screen No.	Percent retained by wt.
8	trace
16	22.4
30	42.6
50	19.4
100	7.7
Pan	7.5

The new plant is located at 4516 D' Hemecourt. The main office of Alatex Construction Service is at 2516 Broadway St., New Orleans 18, La. Lloyd Lewis is vice-president of the company and R. L. Belden is in charge of the perlite division. John E. Meeks is engineer.

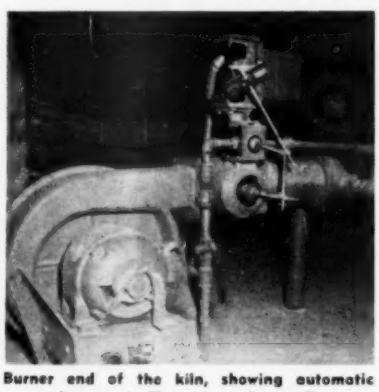
Mineral Resources Booklet

THE CALIFORNIA STATE DEPARTMENT of Natural Resources, Division of Mines, recently published three booklets presenting geological occurences and developments of some of California's mineral resources that are of interest to the rock products industry.

One of these booklets, "The Calera Limestone in San Mateo and Santa Clara Counties, Calif.," deals with the location, accessibility, distribution, and age of Calera limestone, and its relationship to surrounding rock. Also, a section is devoted to the physical and chemical properties of the limestone.

Another of the booklets, "Sierra Blanca Limestone in Santa Barbara County, Calif.," covers topics much the same as in the other limestone booklet, only pertaining to the Sierra Blanca limestone of that locality.

The third booklet, "Geology of the San Diequito Pyrophyllite Areas," discusses the distribution and occurrence of pyrophyllite-bearing rock.



Burner end of the kiln, showing automatic valves controlling air and gas flow

Also included are such topics as: Classification of Rock Types; Volcanic Breccias; Pyrophyllite-Quartz Schist; Pyrophyllite Schist; Mineral Relationships; Chemical Compositions, and Economic Features of Commercial Pyrophyllite.

Each booklet is well illustrated. They contain many maps, pictures and charts to supplement and aid in the explanation and description of these geological occurrences.

Mica and Beryl Deposits

THE DEPARTMENT OF THE INTERIOR'S Information Service recently announced the publication of a report on "Mica and Beryl Pegmatites in Idaho and Montana," written by Walter C. Stoll of the Geological Survey. The report contains a discussion of the geology of the deposits in which these minerals occur, together with a description of mines and prospects examined in each district. Some of the mine descriptions are illustrated by maps and structure sections.

The complete report on Idaho and Montana pegmatites, Geological Survey Professional Paper No. 229, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., at $1.50, or it may be inspected in the Geological Survey Library, General Services Building.

Builds Crushing Plant

THE WESTON & BROOKER CO., Columbia, S. C., is building a granite crushing plant at the Duggan quarry near Sparta, Ga. Production is expected to be 35 to 40 carloads daily. A new spur track is being built to the plant. The company operates plants at Cayce, S. C., and also at Camak, Ga., and is headed by Steve Weston, past-president of the National Crushed Stone Association.

New Use for Vermiculite

ZONOLITE CO., Chicago, Ill., has announced a new use for vermiculite. It was stated that vermiculite can be used successfully as a cushion to protect concrete piers from the shock of earth movements. In studying the effects of soil movements on concrete piers, it was found that if approximately 6 in. of the insulating fill were poured around the piers above the footings and up to a few inches below grade level, that the lubricating action of vermiculite prevented the soil from getting suction on the piers. Thus, it was stated, an expansion joint is formed to protect the pier from movements of the earth, especially valuable in areas where piers are buried in soil which tends to expand and contract greatly during and after rainfall. It was further explained that since vermiculite is a mineral, it cannot become decomposed by water, and consequently, it remains resilient, retaining its lubricating properties indefinitely.

LIME PRODUCERS DISCUSS MARKET DEVELOPMENT

Research, safety and government restrictions also given prominence at annual convention

THE FORTY-NINTH ANNUAL convention of the National Lime Association, held May 24-26 at Hot Springs, Va., was well attended, reflecting the great interest in a program well keyed to the times. This year, there was a separate government relations session. Research is being given great emphasis by the association and, according to custom, an entire session was set aside for its consideration. Use of lime and limestone in the manufacture of steel, its application in liquid waste filtration, and two excellent talks by outstanding speakers on business objectives and the economic situation were the subjects covered in a general session. In addition, regular association business was conducted.

The program of entertainment for both men and the 46 ladies present was patterned along the lines of the highly successful ones of previous years. There was a bingo party with special prizes for the ladies, and the traditional reception and annual banquet. Burton A. Ford and John F. Gruber, St. Regis Sales Corp., were on hand to conduct their traditional unscheduled parties to which all were invited. Plenty of time was left open for the benefit of the golfers.

Officers — Directors

Wallace E. Wing, president, Marblehead Lime Co., Chicago, Ill., was re-elected to a third term as president and chairman of the board of directors; Robert S. Boynton was re-elected general manager; Gladys L. McBee, secretary; and Helen McNamara, Eagle Rock Lime Co., treasurer.

The board of directors elected for the year ahead is as follows: *District 1*, C. C. Loomis, New England Lime Co., Adams, Mass.; *District 2*, Bolton L. Corson, G. & W. H. Corson, Inc., Plymouth Meeting, Penn.; J. P. Feiser, LeGore Lime Co., LeGore, Md., and E. D. Williams, H. E. Millard Lime and Stone Co., Annville, Penn.; *District 3*, Reed C. Bye, Warner Co., Philadelphia, Penn.; F. J. Collins, The Kelley Island Lime and Transport Co., Cleveland, Ohio, and Amos B. Miner, National Gypsum Co., Buffalo, N. Y.; *District 4*, J. A. Dunaway, Peery Lime Co., Inc., North Tazewell, Va.; *District 5A*, Fred Witmer, The Ohio Hydrate and Supply Co., Woodville, Ohio; *District 5B*, Charles Rarey, The Marble Cliff Quarries Co., Columbus, Ohio; *District 6*, L. N. Carmouche, The Dow Chemical Co., Ludington, Mich.; *District 7*, R. F. Mathews, Mississippi Lime Co., Alton, Ill., and Wallace E. Wing, Marblehead Lime Co., Chicago, Ill.; *District 8*, Michael Brisch, Rockwell Lime Co., Manitowoc, Wis.; *District 9*, Henry LaLiberte, Cutler-Magner Co., Duluth, Minn.; *Districts 10 and 11*, K. L. Hammond, Keystone Lime Works, Inc., Keystone, Ala.; *District 12*, Paul Sunderland, Ash Grove Lime and Portland Cement Co., Kansas City, Mo.; *District 13*, G. E. Robinson, Austin White Lime Co., Austin, Texas; *District 14*, Adda M. McMillin, Roche Harbor Lime and Cement Co., Roche Harbor, Wash.; *District 15*, Ralph S. Locke, Diamond Springs Lime Co., Inc., San Francisco, Calif.

The executive committee was re-elected, comprising Wallace E. Wing, K. L. Hammond, J. A. Dunaway, Bolton L. Corson, Amos B. Miner, Reed C. Bye and Kennedy Ellsworth.

Business

A substantial budget was approved for continuing the work of the association. Approximately one-fourth of the total budget is being spent for research and, of the total budget, one-half is spent for research, promotion and education.

Appropriate resolutions were passed in the deaths of John J. Urschel, founder of Woodville Lime Products Co., Woodville, Ohio, and Charles Hoover, superintendent of the water department, Columbus, Ohio. Mr. Urschel was one of the pioneers in the development of Ohio finishing lime and Mr. Hoover was author of the booklet, "Water Supply and Treatment," published by the National Lime Association.

Wallace E. Wing, Marblehead Lime Co., Chicago, Ill., president of N.L.A.

President Wallace E. Wing, in calling the convention to order, stressed the importance of public relations in the conduct of a successful business today and the need for taking advantage of association accomplishments in contacts with government agencies and customers.

Accomplishments of the various appointed committees were briefly summarized by Mr. Wing, who paid praise to the personnel of the several committees. Dr. L. John Minnick was mentioned specially for his activities as chairman of the important research committee. The annual Fall meetings for operating men were mentioned as one of the most successful functions of the association. Hope was expressed that percentage depletion for the lime industry would be passed by Congress. The House Ways and Means Committee had recently approved a 15 percent depletion allowance for the industry which must pass the Senate Finance Committee and then be approved by Congress before it becomes law. A special committee of the association has been working actively for such an allowance. Results of the work of the agricultural committee are best shown, said Mr. Wing, by publication of the booklet summarizing 100 questions and answers on the subject.

Safety Competition

Kent Jander, chemical engineer, National Lime Association, announced the winners of the 1950 National Lime Association safety competition and awarded certificates. Twelve plants were given awards, all of them having operated throughout 1950 without a lost-time injury. The 12 plants winning certificates, as verified by the U. S. Bureau of Mines, were as follows:

Winner in the quarrying and calcining division, working 100,000 or more man-hours, was the Galloway, Mo., plant of Ash Grove Lime and Portland Cement Co. In the same classification, for plants operating

less than 100,000 man-hours, the winners were the Thomasville, Penn., plant of J. E. Baker Co.; the Lee, Mass., plant of Lee Lime Corp.; the McCoy, Penn., plant of Warner Co.; the Ripplemead, Va., plant of Ripplemead Lime Co.; the Frederick, Md., plant of Shank and Etzler Lime Co., and the Evans, Wash., plant of U. S. Gypsum Co.

Winners for the underground mine and calcining plant class were the Kimballton, Va., plants of both the National Gypsum Co., and Standard Lime and Stone Co. Winners for the calcining plant group without quarry or mine were the Ludington, Mich., plant of Dow Chemical Co.; Houston, Texas, plant of Nyotex Chemicals, Inc.; and the Plymouth Meeting, Penn., plant of Phillip Carey Manufacturing Co.

While the number of winning plants was excellent, the safety record established for the year 1950 was not good. A total of 45 lime plants had enrolled in the competition, and 40 of them participated in the monthly accident analysis with a total of 7,600,000 man-hours worked.

There were two fatal accidents, both of which were due to carelessness. In one of these, an employe was crushed to death between the couplings of two box cars. Cross-overs had been provided but the employe elected to take a dangerous shortcut. In the other case, a power shovel was overloaded and tipped over, pinning the man.

There were two permanent partial disabilities and over 175 temporary disabling injuries. Approximately 19,000 days were lost as a result, which, as Mr. Jander pointed out, was costly to the industry in terms of lost production, increased compensation and insurance costs, to say nothing of the human suffering. The frequency rate rose 16 percent over the 1949 figure to 23.9 accidents per million man-hours. Official figures were not yet available but indications were that the severity rate increased some 50 percent over the 1949 figure. The record for 1949, however, was one of the best in the history of the contest.

General Manager's Report

A summary of the principal accomplishments and work of his office during the past year was given by general manager Robert S. Boynton, in his annual report. He started out by pointing to the amazing developments that have taken place since his last annual report and to the resultant effects on his activities. A year ago, the problems of shortages, manpower and inflation were under control, and a buyer's market for lime had actually been developing. Then came Korea, increased taxes and all the government controls with which industry is now entangled.

At present, the number of calls to the association office in Washington has multiplied four times over as a result of government agencies seeking the consultation of trade associations, and a great amount of the time of the association is now spent in dealing with government agencies. Mr. Boynton said that government agencies could easily take ill-advised actions if trade associations were not active in acquainting these agencies with industry problems.

As a case in point, a government agency set out to consider the advisability of expansion of the production of lime without even knowing what lime was. A serious over-expansion might have been the result, had not that agency been made to know the facts. It was pointed out that, in cases like this, there is no intent to injure the industry; rather, it was a case of education being badly needed. Over-expansion of the industry's productive capacity is to be guarded against, he said, but some added lime capacity will no doubt be necessary. At least three years of tough going is anticipated.

The case for percentage depletion, which may or may not be decided before this report comes off the press, was discussed. The gains to be accomplished, should the 15 percent depletion allowance approved by the House Ways and Means Committee be adopted, would more than offset all the other increases in taxes to come, said Mr. Boynton. He believed there was a chance of its approval.

Chemical lime should be stressed by the industry in its contacts with government because of the importance of the chemical industries and their influence on priorities, said Mr. Boynton. Chemical lime represents 75 percent of sales today, exclusive of refractory lime. The great need for improved public relations and the assembly of facts to educate the public and to help users of lime are being given more recognition by the association in its work. The recent publications, "Chemical Lime Facts" and the summary of 100 questions and answers on liming for agriculture, are two efforts in that direction. Also mentioned was the publicity given to lime recently in *Chemical Engineering* and the possibility of having a series of articles on lime published in that magazine. In conclusion, Mr. Boynton thanked Mr. Wing and the board of directors for their cooperative help and he expressed his appreciation to the Washington staff.

Government Activities

An address on the activities of the Defense Minerals Administration was given by Thomas H. Miller, assistant director, U. S. Bureau of Mines. In his opening remarks, Mr. Miller congratulated the association for its interest and participation in the annual safety competition, and expressed his opinion that meetings like this convention were of great importance in furthering the mobilization effort.

He contrasted the conditions and problems existing today with those in connection with World War II. Full war plans were in effect in connection with World War II whereas, now, there is neither peace nor war and the problem is to prepare adequate defenses to avert war while at the same time permitting business to continue with as little interference as possible. There was much unemployment at the time mobilization for World War II got under way, whereas there was high employment and high wages at the time the Korean conflict started.

Industry is being asked to expand under these circumstances. National production was at the rate of $100 billion in 1940 and had grown to $300 billion by the end of 1950. The economy will be further expanded and the increase is planned for $15 billion annually for each of the next three years. This is expected, and with a minimum of dislocations, in order to meet all challenges and to maintain civilian production at pre-Korea lev-

At luncheon, here are Mrs. W. J. Ash, Mrs. David Follett, Irving Warner, David Follett and Mrs. Irving Warner

els, said Mr. Miller in quoting a recent statement by mobilization director Charles Wilson. Expansion of steel production by 14,000,000 tons a year already during the present war was mentioned as an example of planned increases.

Inflation and complacency were mentioned as the most serious enemies to be faced in the times immediately ahead. Government orders are being placed at the rate of $1 billion a week currently, he said, and by the end of 1953 the nation will be in position to meet the challenge of all-out war. So, the greatest danger of inflation and complacency must be faced in the next 2½ years.

The Defense Minerals Administration was described as a liaison agency between the government and the minerals industries set up to assure the minerals required. DMA is set up to assist in procurement, exploration, to assist in cases where accelerated amortization of plant is justified, to help in the solution of manpower problems, guarantee loans in qualified cases, to aid in priorities and in securing MRO items, etc. Lime is being handled on a regional basis. He assured the industry that it is considered as essential to the overall program.

Lime's Roll in Steel

The place of lime in the steel making process was covered in an excellent talk by W. T. Sergy, steel works metallurgist, Jones and Laughlin Steel Corp., Pittsburgh, Penn. Mr. Sergy described in detail the desired characteristics in lime and limestone for making steel and justified the need for the more rigid specifications of recent date on the basis of higher quality requirements in steel itself.

He anticipates that the present capacity for steel, of 100,000,000 tons annually, will be increased to 120,000,000 tons by 1952. Requirements for lime are 1,500,000 tons annually, and 35,000,000 tons of limestone are required for blast furnace operations, with 8,000,000 tons additional required for open hearth steel.

Research committee in session. Left to right are president Wallace E. Wing, L. John Minnick, Robert Boynton, Prof. K. B. Woods, Purdue University, and J. S. Offutt, U. S. Gypsum Co.

Slides were shown of blast furnace operations. A typical blast furnace is 25 ft. in diameter and more than 100 ft. high, producing 2500 tons of iron per day along with 600 tons of slag. Production of a ton of pig iron requires 1¾ tons of iron ore, almost a ton of coke, one-half ton of limestone as a flux and four tons of air. The lime or limestone serves to remove the silica and alumina from the ore and the ash from the coke, resulting in the formation of slag. A vital purpose is the removal of sulfur into the slag and the ability to accomplish this is dependent upon the chemical analysis of the stone. Excess undesirables in the stone, such as silica and alumina, decrease its fluxing properties, so a high lime stone is required with a silica content of less than 2 percent. Sulfur and alumina content each must be less than one percent. A 2½- x 4-in. size, free from fines, is preferred and the so-called "soft" stones are best for rapid slag formation.

A typical open hearth furnace has a capacity of 175-250 tons of steel per heat and the amount of lime and limestone used depends upon the percentage of scrap iron fed in with the ore. The CO_2 evolved from calcining agitates the bath and combines the impurities into a slag. The CO_2 evolved from submerged limestone aids greatly in the transmission of heat.

Silica must be neutralized before sulfur and phosphorus can be removed so the requirement continues to be for higher quality lime; for the higher quality steels, the use of too much limestone adversely affects the steel quality. Sulfur must be very low in the fluxing material because sulfur in the slag can revert back into the steel. Small increment increases in the amount of sulfur result in very serious steel production losses. In the open hearth, man-size stone is preferred. Rate of solution of the stone is important.

Management's Objective

"The Objective of Management" was the subject of a very timely talk by Dr. Robert T. Haslam, formerly vice-president in charge of research for Standard Oil Co. of New Jersey. The overall objective of a business was pointed out as being to secure the continuity of the organization on a healthful basis. This goal, he said, may seem to be obvious but, unless it is recognized, the proper steps may not be taken to guarantee it. Preoccupation may cause management to overlook essential requirements to guarantee survival of the business.

Management must coordinate production, research and other important activities, and must be certain not to overdevelop any one activity at the expense of others. A business may easily develop in a lop-sided way

Left to right are Thomas H. Miller, U. S. Bureau of Mines and wife (left), Ralph L. Dickey, The Kelley Island Lime & Transport Co., Cleveland, Ohio, center, and Mr. and Mrs. Robert S. Boynton

Left: Two perennials at lime conventions are Burton A. Ford, left, and John F. Gruber, St. Regis Sales Corp. Right: Dr. and Mrs. Robert T. Haslam, formerly vice-president in charge of research, Standard Oil Co. of New Jersey; he was a featured speaker

under pressure, he said, reminding that the legal and financial aspects dominated businesses adversely throughout the first 30 years of this century.

Producers should prospect for additional deposits when they are making money and not when business is down. Likewise, the adoption of labor-saving practices must be done in advance of their need in meeting stiff competition to come. Every producer must reduce his unit costs through mechanization in order to fight inflation. In each of the last 12 years, the postponement of equipment purchases has resulted in higher costs for that equipment when eventually installed. A suggestion was that equipment development be discussed periodically with manufacturers.

Dr. Haslam believes the greatest opportunity for reducing costs is in the field of distribution and he said that organized research in the field of marketing is greatly neglected. He told of accomplishments of the Standard Oil Co. of New Jersey as an example of what may be accomplished. A research program on marketing efficiency was started in 1933. By 1950, the unit costs of marketing were reduced 40 percent below 1933 costs, in spite of 170 percent higher wages and other increased costs.

Some suggestions were made for consideration of the National Lime Association in order to guard against new competition from without the industry, the important things being to reduce costs as much as possible and to develop new markets.

In his concluding remarks, he stressed the current important part of public relations, because industry must have favorable relations with government agencies, the public, labor, customers and stockholders on a scale more than ever before. A good public relations program is considered as essential to supplement activities of each department of a business. One thing that has hurt business has been lack of attention to government, which is the key to survival of business.

Stream Pollution

"Lime for Liquid Waste Filtration" was the subject of an illustrated talk by Edgar F. Giullot, assistant sales manager, Filtration Engineers, Inc., Newark, N. J. He principally discussed the application of the rotary vacuum filter in the processing of waste pickle liquor neutralized by lime, as used in the pilot plant operated for research by Marblehead Lime Co., Chicago, Ill.

The large potential for sales of lime for neutralizing purposes was touched upon, the speaker pointing out that there are more than 10,000 factories disposing of their wastes in streams. Of this total, 2600 have treatment plants of which less than one-half are adequate. Of all the neutralizing agents for waste pickle liquor, lime is the cheapest and produces a controllable sludge.

The Marblehead Lime Co. pilot plant started operations in 1949 and has effectively demonstrated a process of treatment, with lime and filters, that is both practical and economical.

A dynamic speech on national problems in their relation to business was given by Clem D. Johnston, Roanoke, Va., former vice-president of the U. S. Chamber of Commerce. Mr. Johnston was very critical of government controls and he warned that all the nations that have crumbled were subjected first to developments like those that prevail in the United States today.

The future of America, he said, depends on the answer to the question as to whether we want profits or not. Today, between $12,000 and $14,000 of risk capital is required to create a single job and the public believes that businesses are making too much profits.

A vital need, according to Mr. Johnston, is the restoration of incentives. Reduction in taxes would reflect, in his opinion, in increased revenues to the government and more jobs. Figures were shown on a chart to emphasize the tremendous growth in taxes and the national debt in recent years.

The philosophy of sharing the wealth has gone too far and, he said, the masses of the nation have been misinformed in accepting the new philosophy of security as their goal rather than progress. For the capitalistic system to succeed, we must have failures as penalties for inefficiency, and rewards for efficiency, according to the speaker, who believes the time now is critical to regain freedoms that have always prevailed before in the nation.

Research

Prof. Walter C. Voss presided over the concluding session which was devoted entirely to reports on the subject of research. In his introductory remarks, Prof. Voss said that industry must continue to capitalize on its efforts or research will be retarded. A retrogression on research would mark a serious backward step for business and must be guarded against.

The first speaker was John K. Selden, coordinator of housing research, Research Foundation, University of Toledo, who reported on research on the use of lime in concrete masonry structural materials. Mr. Selden started his report by reviewing the growth of the concrete masonry industry, which has taken the play away from the brick industry, due to more economical laying costs. Concrete masonry constitutes two-thirds of the total masonry wall market now, according to his figures.

The problem of cracks in concrete masonry walls, due principally to shrinkage and drying out, was mentioned as the most serious obstacle to that industry today. Inadequate curing was mentioned as a factor. The demand for better units is increasing and there is a growing tendency, according to Mr. Selden, to specify lower permissible moisture contents in units. The Army has lowered the permissible maximum contained moisture content from 40 percent to 30 percent and thought is being given to even lower maximum moisture content.

The research program at Toledo University is a cooperative effort of the National Lime Association, the National Concrete Masonry Association, the Portland Cement Association and the federal government. Various aggregate and cementing mixtures are used in the making of commercial-size units which are autoclaved and are tested for volume change, strength and other characteristics under various conditions of temperature and humidity.

It has been proved that high-pres-

sure curing reduces shrinkage by 40-50 percent when compared to that for low pressure steam-cured units. A point of interest brought out is that there is a lag between shrinkage and drying out that may be a serious factor. A manufacturer might subject units to quick drying out and the resulting shrinkage might not occur until a week later.

The various advantages of autoclaved units were summarized, including one-day strengths comparable to 28-day strengths for standard moist-cured units, lighter color, minimizing of popping and spalling, increased resistance to sulfate action, etc. At present lightweight units are under study with 15 and 20 percent replacements of lime for cementing purposes. Autoclaving, alone, isn't a cure-all, it was emphasized, but proper gradation of aggregate regardless of the cementing mixtures used is essential for optimum results. Apparently lime-cement mixtures with properly-graded aggregates reduce the shrinkage problem.

In his summary, Mr. Selden said that there is a potentially large market for lime in autoclaved masonry units. Production of the concrete masonry unit industry currently is at the annual rate of one billion units. Remedies for cracking walls comprise the use of joint reinforcing, forced air drying or high-pressure steam curing. The latter is believed to be the best solution and it was said that purchasers will be willing to pay premium prices for such higher quality units.

Trade Wastes

William Parsons, an associate of Dr. William Rudolfs, Rutgers University, New Brunswick, N. J., presented the report on sewage and trade wastes research. At the outset, he said that the production of H_2SO_4 was 12,000,000 tons in 1950, most of which is discharged as waste. An additional 2-3 million tons of mine drainage must be neutralized. Lime is the preferred neutralizing agent. A disadvantage of high calcium lime is scaling which adversely affects equipment, so the problem is to minimize scaling, which can be done by dilution. The disadvantage of dolomitic lime is the slower reaction rate. Over-neutralization causes hard scaling so it has been proved best to neutralize acids just to pH 4.2 for optimum results.

Fundamental Research

Prof. James A. Murray, associate professor of materials, Massachusetts Institute of Technology, Cambridge, Mass., reported progress on the fundamental research fellowship at M.I.T. Findings of research already done on the calcination of pure calcite have been put to practical value by a lime producer in the manufacture of a type of lime which could not be produced previously, which was mentioned by Prof. Murray as evidence of the potential practical value of fundamental research. Work being done by thermal differential analyses on white coat plasters is bringing out differences in limes undetected previously by conventional chemical analyses.

Left: Prof. Walter C. Voss, Massachusetts Institute of Technology, Cambridge (left), drives a point home to M. A. Rikard (center) and C. H. Ellison, Jr. Right: James A. Murray, also of M.I.T., left, poses with another researcher, John K. Selden, University of Toledo

Eight of 16 limes carbonated within seven days while others required up to a year's time, which shows the great differences between limes in their rates of carbonation when applied as plaster on walls. Prof. Murray said that he believed extreme cases of over-burning of lime were responsible for some of the serious failures reported by Dr. Lansing Wells of the National Bureau of Standards and that the entire industry should not be condemned for these cases.

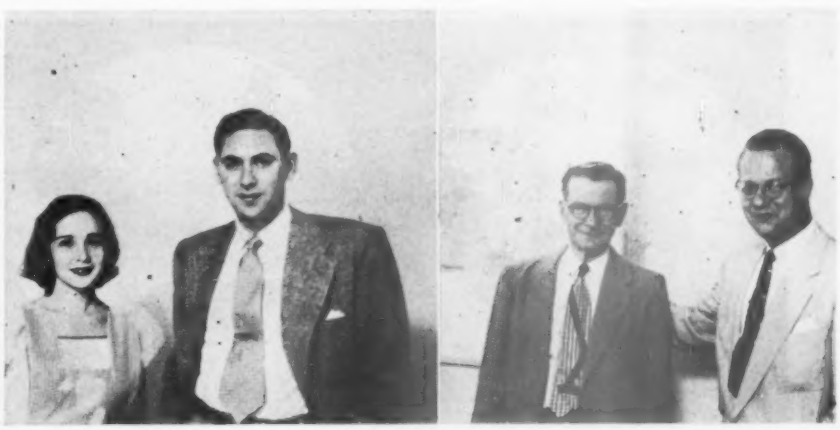
Prof. Murray then told of studies that have proved that the addition of small amounts of salts to other limestones results in giving properties to the lime similar to the Ohio dolomites. Further findings in the studies of the burning of calcite at different temperatures and retention times was reported. Work will continue in determining the effects of impurities on the activity rate.

Lime Stabilization

Prof. K. B. Woods, professor of highway engineering, Purdue University, reported on the lime stabilization research at Purdue. Previously, changes in plasticity and in the strength characteristics of soils was reported; the second phase has been a study of durability characteristics as determined by A.S.T.M. freezing and thawing tests. Durability was not found to be too favorable in some mixes. It was found that use of 5 percent lime mixed with a fine-grained soil gave good durability results when 2 percent bituminous material was included.

Recently, the soniscope has been

(Continued on page 84)



Left: A newcomer was Lester Crown, Marblehead Lime Co., Chicago, Ill., shown here with Mrs. Crown. Right: Prof. Walter C. Voss, M.I.T., left, with managing director Bob Boynton

Research on Hydraulic Properties of Granulated Blast Furnace Slag

By TARO TANAKA and KUNIHIRO TAKEMOTO*

SINCE THE DISCOVERY of the latent hydraulic property of granulated blast furnace slag by Emil Langen in 1862, many others like Michaelis, Tetmajer, Le Chatelier, Zulkowski and Passow have studied its physical and chemical properties. In these days practice of its use as iron-portland- or blast-furnace-portland-cement is already prominently developed, but unfortunately its chemistry is still full of mystery. Even the rapid measurement of quality of slags is not sufficiently settled and practically has met with much inconvenience; this is the reason why the authors picked this problem for study.

Michelsen's Method

According to Michelsen, in the case of granulated slags of good quality with aluminum sulfate solution, the first crystal on the slide glass appears as quickly as one minute, and the crystals grow very fast but are short in length. On the other hand, in the case of poorer hydraulic slags, it takes about four minutes before the first appearance of crystals, which grow slowly and long.

The samples of slag used by the authors are shown in Table I; "F" and "G" are respectively from Yawata blast furnace, the former a fresh slag granulated with water spray, almost free from other substances which give high strength when activated with portland cement clinker; the latter an old weathered one, containing some loss-on-ignition impurities, high in SiO_2, low in CaO and Al_2O_3 and giving lowest strength.

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"H," from Anshan blast furnace in Manchuria, stored for ten years in sealed wooden barrels, shows high insoluble content; "I," from Kamaishi blast furnace, is high in SiO_2 and MgO. The content of sulfide sulfur in slags ranges from 0.98 percent to 0.69 percent. For comparison, a crystalline blast furnace slag "L" from Yawata is taken and its chemical analysis is also tabulated.

The crystalline blast furnace slag "L" showed certain Debye-Scherrer lines by x-ray. The granulated slag, however, is quite different and showed no lines. The difference between the crystalline and glassy structure is thus clearly distinguished but at present it is uncertain what are the constituent minerals of crystalline slag "L," notwithstanding the measurement of the lattice dimensions.

Strength of Slag

In order to compare the grade of latent hydraulic property of slags the authors tested the compressive and bending strengths of concrete mixed with the granulated slag and portland cement clinker, afterward adding 3 parts gypsum. Results of concrete tests are tabulated in Table II.

Crystalline slag "L" was likewise tested for its hydraulic properties. In Table II, the fineness of cement "F," "G," "H" and "I" is mentioned; the strength of each cement, however, is considerably different. It is doubtful whether the crystalline slag has latent hydraulic properties as Leduc[2] reported. The index of basicity of slag, $\frac{CaO + MgO + \frac{1}{3} Al_2O_3}{SiO_2 + \frac{2}{3} Al_2O_3}$ is also tabulated in Table I. The relation between this value and the strength of cement was not definitely observed.

Tests by Michelsen's Method

The details of Michelsen's method are as follows: The finer part of slag powder smaller than 63μ in diameter is used as a sample and is dipped with platinum wire into 2 percent solution of $Al_2(SO_4)_3$ on a slide glass; it is covered with a cover glass, and the time measured until the first crystal can be seen in the microscope. As Michelsen does not specify temperature, the authors adjusted the room temperature to 20±1 deg. C. throughout the experiments. Photographs of crystals formed from slag powder are shown in Fig. 1.

Considering the results of the tests, the times measured show no good uniformity for each slag, as previously supposed, but in an average of five measurements, slag "F" gives 1-2 min., "H" and "I" 2-3 min., and slag "G" 3-4 min., and in conclusion it shows fairly good accordance with the activated hydraulic properties of slags. At first the authors selected the fine 30-40μ slag powder by air elutriation, then reduced the microscope magnification to 40:1 in order to trace as many crystals as possible in the field. The concentration and the quantity of $Al_2(SO_4)_3$ solution and the weight of slag powder taken as a sample are the same as mentioned before. They measured each slag 20 times in this way. The method gives no per-

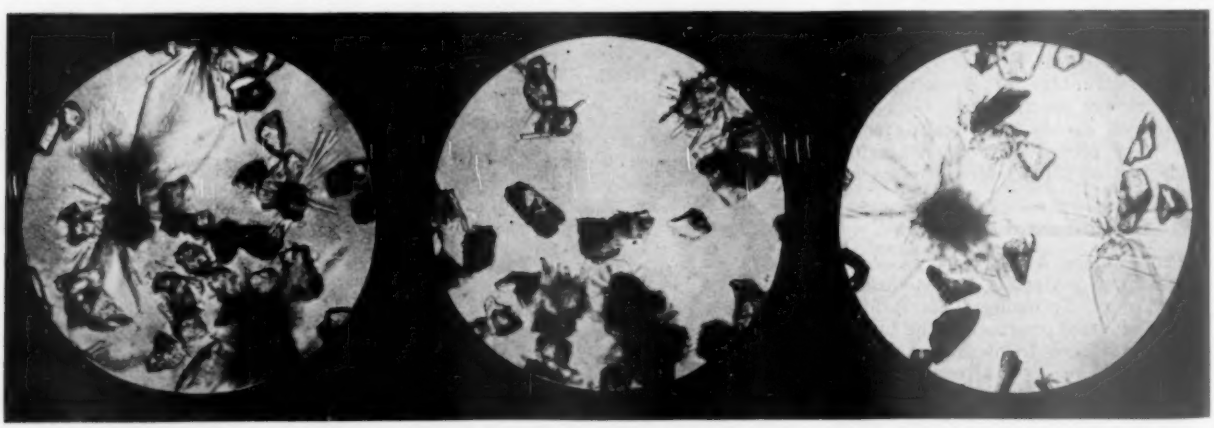

Fig. 1: Photographs of slag crystals obtained by Michelsen's method, 220x. The two samples at left are granulated slag; the one at right is a crystalline slag

fect results, but it does give fair uniformity.

Table III gives the relation between the time required and the index of strength for each slag. For slags, the indices of strength developed were calculated as follows: from Table II the total value of strengths was calculated through each age, i.e., from 3 days to 28 days or 3 days to 6 months, separately. Then the index value for each slag was determined and compared with those of slag "F," the best hydraulic one. Fig. 2 shows this relation graphically, and from this it appears that the faster the formation of crystal, the better the latent hydraulic property of slag, except for the crystalline blast furnace slag.

According to Michelsen, the crystal grows very fast but is small in size when the granulated slag is of better quality, and vice versa. The authors also observed these properties of slags in their experiments, in which the microscope magnification is 180x; they measured the growing velocity of crystal every minute for 20 min. or more, reading the length of crystal in microns. After about 10 hr. later, the sizes of the various forms of crystals were measured. The crystals shown in Fig. 1 take several modifications in needle-like, twined-form or some group of radial ones. The measurement of crystallization is carried out only upon the needle form, but the size of every form of crystal was measured.

Michelsen reported no identification of crystals he obtained nor any of the chemical reactions. A. Guttmann[3] described also in his work, "Die Verwendung der Hechefenschlacke," that the mechanism of Michelsen's experiment is unknown. One of the aims of the authors depends upon this point; they hoped to identify the crystals first, then determine the mechanism of the reaction.

In the treatment of the slag powder with 2 percent $Al_2(SO_4)_3$ solution, it might be supposed that $CaSO_4 \cdot xH_2O$ would be formed, because aluminum sulfate is very amphotoric and may produce SO_4'' in dilute solution by hydrolysis and then this may react on the slag.

On the other hand, at a glance at twined crystals, it is seen that this form of crystal is often characteristic for gypsum, but experiment is necessary to show it. At first the authors measured the facial angles under the microscope after 48 hr., taking care not to evaporate the solution of $Al_2(SO_4)_3$ in the slide glass. The mean value of angles measured on ten crystals for granulated slag "F" and "G" gave the same value of 53.1 deg. C. for twined or single crystal, which coincides almost perfectly with that of gypsum ($CaSO_4 \cdot 2H_2O$).

Table IV shows the indices of refraction and also the chemical analysis of crystals measured. For all

KIND OF SLAG		GRANULATED SLAG				CRYST. SLAG
SYMBOL		F	G	H	I	L
APPEARANCE		WHITISH FOAMY	BLACKISH FOAMY	WHITISH FOAMY	LIGHT BROWN SANDY	WHITISH BALLAST
	IG LOSS	-1.05	-0.25	+0.28	-1.54	+5.00
	(INSOL RES)x	3.14	3.16	7.62	4.02	18.62
	Si_2	34.08	38.18	39.42	37.52	35.49
CHEMICAL COMPOSITION %	Al_2O_3	13.72	11.42	11.00	12.26	12.91
	Fe_2O_3	0.12	0.34	0.12	0.08	0.51
	FeO	0.66	1.16	0.70	0.63	0.73
	MnO	1.30	2.00	1.12	1.67	0.92
	CaO	45.90	42.00	42.32	43.62	43.38
	MgO	2.46	2.36	2.54	4.08	3.72
	SO_3	0.12	0.21	0.17	0.03	0.78
	S	0.98	0.75	0.99	0.69	1.03
	$\frac{C+M+\frac{1}{2}A}{Si+\frac{1}{2}A}$	1.22	1.05	1.04	1.13	1.16
	SiO_2/Al_2O_3	2.48	3.34	3.58	3.06	2.75

x IN % OF SiO_2

Table I. Appearance and chemical composition of samples

granulated slags, the authors found an index of refraction which coincides with that of $CaSO_4 \cdot 2H_2O$,[5] especially the chemical analysis giving the result of chemical composition of formed crystals. For crystallized slag "L," though the chemical analysis of the isolated crystal shows that a few samples of slag powder were contaminated, the essential composition is also identified with $CaSO_4 \cdot 2H_2O$. The authors thus confirmed that Michelsen's crystal is calcium sulfate in the form of pure gypsum, and then considered further what is the mechanism of chemical reaction which takes place in the solution of aluminum sulfate.

As already mentioned, in the dilute solution of $Al_2(SO_4)_3$, the following hydrolysis is assumed:

$$Al_2(SO_4)_3 + 6H_2O = 2Al(OH)_3 + 6H^+ + 3SO_4''$$

Thus the dilute sulfuric acid reacts on a certain composition of slag. In order to explain clearly these assumptions, they made an experiment on granulated "F" and "G." A series of other 2 percent sulfate solutions, for instance $Fe_2(SO_4)_3$, $CuSO_4$, $ZnSO_4$, $NiSO_4$, $MgSO_4$, etc., were considered as reagents and their reactivities measured by pH values. It is important to determine whether such salts can react with slag powder or not, and if they react, what is their effect on the crystallization of each slag, especially on the relation between the acidities of these salt solutions and the prolongation of the time required for the first crystal to be observed. The acidities of 2 percent solutions varied from 1.8 for $Fe_2(SO_4)_3$, 3.5 for $Al_2(SO_4)_3$, 5.4 for $CuSO_4$, 6.1 for $NiSO_4$, and also 7.0 for saturated solution of gypsum.

	SLAG	F	G	H	I	L
SLAG/CLINKER = 60/40	FINENESS % 0.088 M.M. SIEVE	4.0	4.2	3.8	4.2	3.2
	FINENESS % 0.063 M.M. SIEVE	17.6	17.8	17.0	17.8	15.6
	BENDING STRENGTH K$\frac{g}{cm^2}$ 1 DAY	11.9	7.6	10.9	7.3	5.0
	3 DAYS	22.3	12.8	22.7	15.9	10.4
	7 DAYS	33.8	21.5	31.2	26.5	14.9
	28 DAYS	47.7	32.0	54.2	53.7	22.5
	3 MONTHS	61.8	54.0	67.3	64.8	32.3
	6 MONTHS	64.3	58.4	67.5	68.2	36.5
	COMPRESSIVE STRENGTH K$\frac{g}{cm^2}$ 1 DAY	32	18	28	19	12
	3 DAYS	76	39	65	43	35
	7 DAYS	129	70	112	85	48
	28 DAYS	280	154	231	251	74
	3 MONTHS	413	270	330	399	99
	6 MONTHS	472	333	366	457	114
SLAG/CLINKER = 80/20	FINENESS % 0.088 M.M. SIEVE	3.8	3.8	3.4	3.9	4.4
	FINENESS % 0.068 M.M. SIEVE	17.4	17.0	17.2	17.0	18.8
	BENDING STRENGTH K$\frac{g}{cm^2}$ 1 DAY	8.8	4.1	5.5	4.3	1.6
	3 DAYS	19.0	7.7	13.0	8.9	2.0
	7 DAYS	31.2	16.0	24.8	20.2	5.2
	28 DAYS	53.4	32.2	47.7	47.4	11.3
	3 MONTHS	65.0	48.7	67.9	57.7	20.2
	6 MONTHS	69.6	59.8	68.9	59.8	25.3
	COMPRESSIVE STRENGTH K$\frac{g}{cm^2}$ 1 DAY	17	8	11	7	—
	3 DAYS	50	24	36	22	9
	7 DAYS	110	45	78	59	15
	28 DAYS	229	117	157	181	26
	3 MONTHS	321	195	231	303	44
	6 MONTHS	364	237	250	338	45

Table II. Strength test of slag activated by clinker

Conclusions

1) Michelsen's method for the quality of granulated blast furnace slag was found to be fairly reliable with respect to the relation between the latent hydraulic property and the developed strength of the granulated

SLAG	TIME MIN. SEC.	a) INDEX OF STRENGTH UP TO 6 MO. BEND. ST.	a) INDEX OF STRENGTH UP TO 6 MO. COMP. ST.	b) INDEX OF STRENGTH UP TO 28 DAYS BEND. ST.	b) INDEX OF STRENGTH UP TO 28 DAYS COMP. ST.
F	2:23	100	100	100	100
G	4:27	74.1	60.3	58.9	50.7
H	2:55	100.6	75.3	92.1	76.5
I	3:00	90.8	86.4	80.8	72.0
L	2:27	39.0	20.0	31.8	23.1

INDICES OF STRENGTH MEANS $\frac{\text{STRENGTH}(60:40)+\text{STRENGTH}(80:20)}{2}$

Table III. Time required for the first crystal to be observed and average index of strength

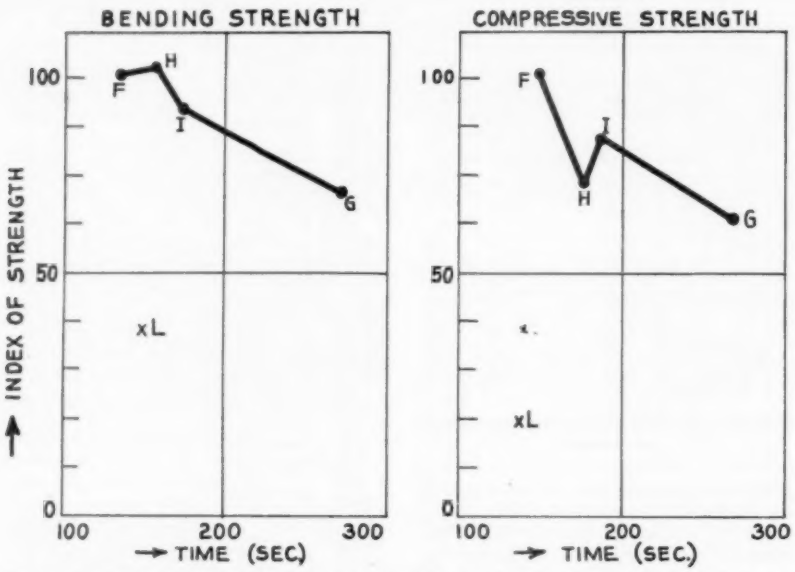

Fig. 2: Relation between time required for first crystal to be observed and index of strength up to six months

	SLAG	F	G	H	I	L	$CaSO_4 \cdot 2H_2O$
CHEMICAL ANALYSIS %	IG.LOSS	22.31	20.89	21.43	21.45	21.17	20.93
	SiO_2	0.63	0.68	0.68	0.46	4.45	—
	R_2O_3	0.38	0.56	0.60	0.38	2.73	—
	CaO	31.47	31.83	31.79	32.01	29.69	32.57
	SO_3	45.68	46.13	45.80	45.03	41.41	46.56
	TOTAL	100.48	100.09	100.30	99.33	99.45	100.00
	$CaSO_4 \cdot 2H_2O$ FROM CaO	96.61	97.72	97.60	98.27	91.15	—
	$CaSO_4 \cdot 2H_2O$ FROM SO_3	97.66	99.20	98.49	96.83	89.05	—
	CaO/SO_3	0.69	0.69	0.69	0.71	0.72	0.70
REFRACTIVE INDEX	α	1.521	1.521	1.521	1.520	1.521	1.521
	β	1.523	1.524	1.523	1.524	1.524	1.523
	γ	1.532	1.531	1.530	1.531	1.531	1.530
	$\gamma - \alpha$	0.011	0.010	0.009	1.011	0.010	0.009

Table IV. Chemical analysis and refractive index of crystal formed by reaction of aluminum sulfate and slags

slag, activated with portland cement clinker.

2) The time measured, finding the first crystal formed from the granulated slag powder in the 2 percent solution of $Al_2(SO_4)_3$, is 1-2 min. for the better hydraulic slag and 4-5 min. for the poorer slag; the growing velocity of the crystal of the former is rapid, generally shorter than 20 min., and of the latter slow, more than 20 min.; also the grown crystal of the former is always short and almost always under 30μ in length, the latter is long and about 40-60μ respectively.

3) It was impossible to improve this method quantitatively.

4) For the crystalline slag, Michelsen's method is not applicable and Leduc's consideration of its hydraulic properties is doubtful.

5) The crystal obtained in this method is gypsum which was verified by chemical analysis, the indices of refraction and also the facial angles.

6) The mechanism of the chemical reaction between the 2 percent solution of aluminum sulfate and the slag powder is ascertained and explained as follows: dilute solution of aluminum sulfate yields sulfuric acid by hydrolysis. This sulfuric acid reacts with the slag powder, decomposing a certain part of the constituents: thus gypsum is crystallized out of the solution slowly or quickly, depending upon the reactivity of the slag itself.

7) This method was attempted simultaneously with several sulfates of other metals and the authors confirmed the greater the pH value of the solution, the longer the time needed for the first crystal to be observed.

8) By dissolving slag powder in $Al_2(SO_4)_3$ solution the authors found the difference of solubility between the crystalline structure and the granulated one. It is impossible to compare these two slags with respect to their solubilities, but in the case of amorphous structure of the granulated slag the later the reaction velocity, the poorer the hydraulic qualities.

References

1) Sv. Michelsen, *Zement*, 1931, p. 588
2) E. Leduc, *Rev. Mater. Constr.*, 1935
3) A. Guttmann, "Die Verwendung von der Hechefenschlacke", p. 94
4) Behrens-Kley, "Mikrochemische Analyse" I, IV Aufgabe, p. 49
5) Winchell, "Elements of Optical Mineralogy" Pt. II, p. 105, (1933) London

Lime Producers Meet

(Continued from page 81)

used in studies of durability. The various soils used in the tests thus far, with various percentages of lime, are an old midwestern drift, an old drift material and a clay-gravel. Thus far only high-calcium lime has been used in the tests.

In the experience of the Texas State Highway Department, durability has been found to improve with age, indicating that an extended curing time is desirable. Figures were given which showed considerable increases in strength for various mixes according to time of curing. Curing time is to be studied in the future program.

A summary of the findings thus far is that the texture of the soil is important in stabilization, that the influence of curing time indicates that lime stabilization should be done in the spring and early summer, and the benefits from curing show up greatest with higher lime contents in the mix.

Lime Products Plant Sold

LOUISA COUNTY LIME PRODUCTS CORP., Wapello, Iowa, was recently sold to Charles Hohenadel, Wapello and Frank W. Hunzinger and James McDonough of Milwaukee, Wis. The plant is being operated under the same name, with Mr. Hohenadel, president and Mr. Hunzinger, vice-president.

Synthetic Foundry Sand

THE UNIVERSITY OF WASHINGTON'S Engineering Experiment Station and Department of Mechanical Engineering, in a recent research project have discovered a new type of synthetic foundry sand which may be in competition with the silica sand now used in foundries. The synthetic sand is made from crushed olivine rock which is found in quantities only in Washington State and North Carolina. The silica sand now used by most West Coast foundries is imported at considerable expense from Illinois and Belgium, according to Prof. Gilbert C. Schaller of the University's mechanical engineering department.

SELECTION OF V-BELT DRIVES FOR BEST PERFORMANCE

By F. J. DONAHUE*

MANY TIMES IT IS POSSIBLE to figure a drive arrangement which is much better and surprisingly less expensive than another for the same job. In other words, a first solution of a drive problem is not necessarily the best, and it can often be improved by study and calculation. Basically, however, there is a prime consideration which is the key to most such improved drives. This is the matter of small sheave pitch diameter.

Flexing a rubber V-belt around a too-small pitch diameter sheave will cause excessive heating, rapid wear and early failure of the belt. Certain pitch diameters have long been recognized by the V-belt drive industry as minimums below which it is unwise to go. These minimum pitch diameters are as follows:

A belts	B belts	C belts
3.0 in.	5.4 in.	9.0 in.
D belts	E belts	
13.0 in.	21.6 in.	

Further in this regard, a study of V-belt rating tables will demonstrate that the use of small diameter sheaves penalizes a drive in two ways: First, for a given r.p.m., the smaller sheaves produce a lower belt speed and consequently a lower hp. rating; second, for a given belt speed the smaller sheave produces a lower hp. rating than a larger sheave at the same belt speed. Continuing to study the belt rating tables, it will also be noted that on small diameter sheaves there is a further penalty suffered—namely, at higher belt speeds no ratings are shown. Thus, one is subtly discouraged from using very small diameter sheaves at higher speeds. This merely reflects the fact that harmful as it is to operate very small diameter sheaves at moderate speeds, it becomes rapidly harmful at higher speeds.

To illustrate these points in a practical way, we shall review two quite dissimilar problems from the standpoint of a run-of-the-mill, perfunctory solution and then from the standpoint of a more careful, considered approach deliberately avoiding too-small diameter sheaves in relation to the belt section used:

Examples Given

Case 1

Required a V-belt drive from a 15-hp. normal torque motor at 1750 r.p.m. to a centrifugal blower at 1272 r.p.m. The ratio is between 1.37 and 1.38. Without much thought, the following drive with stock sheaves and belts would probably be quoted: Catalog 6-B46-5.4-7.4 Center Distance 13.5 in. According to this recent manufacturer's catalog, this drive would have a total rating of 18.2 hp. and cost the user $40.48 net. Now, if we could improve the small sheave pitch diameter it would improve the drive. From the same manufacturer's catalog, we could work out a stock drive for practically the same ratio such as Catalog 5-B55-6.8-9.4 Center Distance 15.4 in. This drive would be substantially better than the other. It would have a total rating of 22 hp. and cost the user only $36.81 net. Thus, by using larger sheaves we save one belt, one groove on each sheave and still provide a larger hp. capacity at a price some ten percent lower than the drive using the smaller diameter sheaves.

Case 2

Required a V-belt drive to operate from a 100-hp. wound rotor motor at 870 r.p.m. to a centrifugal pump at 1600 r.p.m. From observation, we know that some would feel compelled to use "D" section belts in this drive in view of the hp. requirements of the job. However, in their well-intentioned and quite justified avoidance of belt speeds much beyond 5000 f.p.m., they would quote something like the following drive: Catalog 12-D173-22.0-12.0 in. Center Distance 60.7 in. It will be found that the 12.0 in. sheave was selected because it was the largest that could be used without considerably exceeding 5000 f.p.m. belt speed. Actually it produces 5040 f.p.m. The rating table for "D" section belts shows no ratings for a 12.0 in. diameter sheave beyond 3800 f.p.m., indicating quite definitely the undesirability of operating "D" belts on a 12.0 in. sheave beyond 3800 f.p.m. This drive would cost a user $636.84 net.

Studying such a drive with an eye to bettering it, the 12.0 in. sheave would claim our attention at once. It is a full inch smaller than the minimum generally regarded as acceptable. Yet, to select a larger sheave would be to err in the other direction; i.e., excessive belt speed. The solution is really simple. Why not retain the present sheave diameters but go to the next smaller belt section, namely "C" section, for which the 12.0 in. diameter is generous and comfortable? This would give us a far superior drive from several standpoints: Catalog 11-C173-22.0-12.0 in. Center Distance 60.5 in. would cost the user $283.03 net, a saving of over $250 or nearly 40 percent. The face width of the 12-D groove sheaves would be 17⅞ in. compared with the 11-C groove sheaves whose face width would be 11¾ in., or a saving in face width of over 6 in. Frequently, compactness such as this is highly important, especially when the installation is to be made in an old plant.

These advantages are enough alone, but consider another reason for going to a smaller belt. Assuming the correct theoretical tension on a "D" belt to be 230 lb. and that for the "C" belt to be 125 lb., the 12-D belt drive would require 2760 lb. tension between shafts and the 11-C belt drive would require only 1375 lb. The advantages of lower bearing pressures need no explaining.

These examples are given to emphasize the need of using care in selecting drives. The convenient tables worked out for the catalogs cannot take all factors into consideration. That is left to the engineer.

*Application engineer, Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Perlite for Drilling Mud

GREAT LAKES CARBON CORP., New York, N. Y., has announced the publication of a folder on Strata-Seal, a lightweight additive said to combat and prevent lost circulation of drilling mud. Strata-Seal is available through leasing mud service companies throughout the United States and abroad, and is supplied in 4-cu. ft. paper bags. Great Lakes Carbon has established a separate division to handle this new product, and other oil industry products, called "Strata-Crete Sales." The folder is available on request from the main office of Strata-Crete Sales, Great Lakes Carbon Corp., 5845 Atlantic Ave., Long Beach 5, Calif.

Expands Operations

THE STOCKPORT SAND & GRAVEL CO., McConnelsville, Ohio, a partnership composed of John S. Patterson and Fred Price, took over the John Hurst plant in Morgan county, and has expanded production at its present plant to 100 t.p.h. The company supplies coarse aggregate and sand principally for highway construction.

Vermiculite Producers Hold Annual Meeting

New markets and promotional ideas emphasized by Vermiculite Institute

IMPORTANT NEW USES of vermiculite were discussed at the annual meeting of Vermiculite Institute of Chicago at Fort Lauderdale, Fla., April 7-12, attended by members from all parts of the U. S. and Canada. Philip D. Armour, chairman of the board of Zonolite Co. and grandson of the founder of Armour & Co., was among those present. Stanley K. Robinson of F. Hyde & Co., Montreal, Canada, president of the Institute, presided.

Floor Construction

Of great interest to the building industry is a new structural vermiculite-sand concrete designed for floor construction where bar joists or junior I-beams carry the slab. This concrete weighs half as much as ordinary concrete, and will save critical steel. Recent tests of full-scale models at Jacksonville, Fla., showed that a 3-in. floor slab over 24-in. center joist spacing will carry from 15 to 23 times more live load (depending on the type of reinforcing used) than the 80 lb./sq. ft. required for many light occupancy buildings.

Other advantages are good insulation value (four times that of sand concrete) and resiliency approaching that of wood floors. Both of these properties mean more comfort and foot-ease to occupants. The compressive and indentation strengths of the new concrete are adequate for use as a base for tile (ceramic or composition), linoleum, terrazzo, or carpeting, without the addition of a regular sand concrete topping. The new concrete was developed under the direction of the institute's technical committee, of which C. A. Pratt, vice-president, Western Mineral Products Co., Minneapolis, Minn., is chairman.

Conservation of Steel

Eric W. Hammarstrom, chief, Nonmetallic Building Materials Branch, National Production Authority, guest speaker at the meeting, expressed certainty that vermiculite as insulation and as a lightweight aggregate replacing sand in plaster and concrete will greatly relieve the shortage of critical construction materials. Mr. Hammarstrom pointed out that expenditures for the defense program will fall most heavily on metals and chemicals, and that these vital products will become increasingly hard to obtain as the year progresses.

Stuccos

A new exterior stucco that reduces cracking and is easier to apply than straight sand stucco mix was described by Glenn Sucetti, vice-president, California Zonolite Co., Los Angeles. The unique properties of the new stucco are obtained by adding vermiculite concrete aggregate to the usual sand and cement mix. The vermiculite aggregate gives the stucco mix greater resiliency and "slip" Mr. Sucetti said.

"There are a number of other advantages," he added. "Vermiculite stucco costs the owner less than sand stucco, makes a more waterproof wall, reduces dead load on the building, and provides fireproofing and insulation."

The light weight and adherence of vermiculite stucco allow it to be put on in greater thickness. Mr. Sucetti gave as an example a store front that needed a 2-in. stucco application to bring it in line with adjoining structures. This could not have been done with a straight sand-cement mix, but was successfully completed with two coats of vermiculite stucco, Mr. Sucetti stated. The new stucco was used on 400 houses recently built by a large California contractor.

Roof Tile

A new precast vermiculite concrete roof tile developed by Southern Zonolite Co., Atlanta, Ga., was described by Robert Sterrett, president of the firm. Its advantages, he said, are quick installation, fireproofing, insulation, and a finished exposed ceiling on the underside—all in this one material. The high insulation value of the tile was graphically shown by recorded temperatures in a drying kiln recently constructed, Mr. Sterrett said. Even with a temperature of 590 deg. F. inside the kiln, the highest temperature in the tile recorded by thermocouples was only 190 deg. F.

The tile is 18 in. wide, 36 in. long, 3 in. thick, and weighs about 10 lb./sq. ft. The block are laid in place on steel sub-purlins or steel joists spaced 36 in. on centers. The slabs are butted tightly together, and covered with a built-up roof of pitch-and-gravel.

"This tile is finding a national market," Mr. Sterrett said. "We have shipped carloads of it as far west as Colorado and into a large number of northern states. Just recently, the city of Pittsburgh approved the use of our tile in that area."

Gerald R. Stark, president of Vermiculite Institute

Roof Insulation

Asphalt-bound vermiculite roof insulation, another new development, was discussed by Stanley K. Robinson. It has been used successfully on a number of buildings. Recently, a Detroit contractor placed a 4600-sq. ft. roof of the material in a single day. Besides speedy application, the vermiculite-asphalt mix is light in weight and provides insulation. Built-up roofing can be applied the same day the mix is applied. The only special equipment needed is a plaster mortar-type mixer.

Fire Tests

Dayton Prouty, general manager of Zonolite Co.'s Dearborn Division and chairman of the institute's plaster subcommittee, reported that in addition to the large number of fire tests that have already been conducted to establish vermiculite plaster as an effective medium for fireproofing steel construction, additional fire tests will shortly be made by the Bureau of Standards on columns and on solid vermiculite plaster partitions. This is being done to keep pace with new developments and with a view of promoting ever lighter and less expensive construction. Mr. Prouty displayed a

Eric W. Hammarstrom, Nonmetallic Building Materials Branch, National Production Authority, addressing the group. S. K. Robinson, presiding, at right

miniature sample of the type of column protection that will be tested.

L. A. Barron, engineer, Vermiculite Institute, discussed vermiculite and building codes. He cited four major regional codes in all of which vermiculite plaster and fireproofing, vermiculite concrete, and vermiculite acoustical plastic are specifically approved for use.

Vermiculite in Fertilizers

The use of expanded vermiculite as a unique fertilizer conditioner was discussed by Dr. George E. Ziegler, research director, Zonolite Co., Chicago, Ill. He has been conducting an extensive experimental study of the potential use of vermiculite in agriculture. About one-half of the total fertilizer now produced requires a conditioner, according to Dr. Ziegler, which is added primarily to prevent the fertilizer from caking. Most conditioners are by-products of organic origin. Their supply is seasonal, their quality variable, and they often represent a serious fire risk, according to Dr. Ziegler.

"Vermiculite, on the other hand," he said, "is fireproof and verminproof. It is available in any quantity that may be demanded by fertilizer mixers. But, most important of all, it is a consistent product of definite physical and chemical properties."

Advertising and Sales

Carlyle Emery of Chicago, vice-president of Ruthrauff & Ryan, Inc. advertising agency, was the final speaker on the program. Mr. Emery said that advertising and selling are the only answer to the challenge of the productive capacity of American business, and listed five essential points for an all-star advertising program.

"The product must be competitive in quality and price," Mr. Emery declared. "The copy story must be based on the public's known reading and buying habits. Repetition is essential, for it is human nature to forget. Merchandising is a 'must.' And, finally, good human relations, which is understanding and cooperating with the other fellow, mean more than a glib tongue."

Members of Vermiculite Institute at the annual meeting, held at Fort Lauderdale, Fla.

In closing, Mr. Emery quoted a number of extremely pessimistic predictions by great men or great publications on the future of American business. All might have come out of the contemporary scene, but actually all were made over a hundred years ago. Mr. Emery pointed out that the phenomenal growth of the country and of industry during the past century, despite these gloomy predictions, gave hope that there is sufficient vitality in our country today to overcome similar forecasts now being made.

Gerald R. Stark, president, Texas Vermiculite Co., Austin, was elected president of the institute, succeeding Mr. Robinson. J. B. Lyall, vice-president of Vermiculite-Northwest, Inc., Spokane, Wash., was elected to the board of directors. Other members of the board are John Myers, vice-president, Zonolite Co., Libby, Mont., C. A. Pratt, G. R. Stark, and S. K. Robinson.

A gavel carved from a White House timber, removed from the historic building during the current remodeling, was presented to Mr. Robinson in the name of the institute by Walter Simpson, past-president of V. I.

The meeting was concluded with a banquet at the Lauderdale Beach Hotel.

C. A. Pratt, vice-president, Western Mineral Products Co., Minneapolis, left, and Mr. Robinson

Cement Plant to Double Capacity

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., according to a recent report in the Kansas City, Mo., *Star*, is planning the building of a new cement plant, involving an outlay of several million dollars, on the river site of its existing plant a mile northeast of Sugar Creek and directly north of Independence. The report stated that the new plant, when completed in 1952, will double the present plant capacity of 100,000 bbl. of cement per month. It was stated that the existing plant would be replaced within five years by a duplicate of the projected unit.

The existing plant, built about 1905 and modernized in 1930-31, will operate during the building of the new structures and kilns. Engineering and construction of the new plant will be done by MacDonald Engineering Co., Chicago, Ill. Plans provide for starting plant construction in September, 1951.

The new plant for Sugar Creek is part of a modernization and expansion program undertaken at the close of World War II. It was stated that some $12,000,000 already has been expended in the program, including a new cement plant in St. Louis, with a capacity of 200,000 bbl. per month, and new cement storage and shipping facilities at Memphis.

NONMETALLIC MINERALS IN NORTHWEST

Minerals conference discloses great development in natural resources and potentials for future

By RALPH S. MASON*

OVER 80 DELEGATES attended the fourth annual Northwest Industrial Minerals Conference held in Portland, Oregon, April 27-28. The meeting, sponsored jointly by the Oregon Section A.I.M.E. and the Industrial Minerals Division of A.I.M.E., consisted of two technical sessions on Friday, supplemented by a luncheon, cocktail party and banquet, and visits to three plants in the Portland area on Saturday. This year marked the first time that the Conference has had national A.I.M.E. support. In the past each of the three A.I.M.E. sections in the Northwest has taken turns playing host. The present series was inaugurated in Portland in 1948, with meetings at Spokane and Seattle in 1949 and 1950, respectively.

After brief remarks by General Thomas M. Robins, president of Raw Materials Survey, an industry-sponsored organization, the morning technical session opened with a symposium on the economy of industrial minerals in the Pacific Northwest. Four papers were presented, "the Inland Empire area" by Don W. Walters, managing engineer, Inland Empire Industrial Research Inc.; "the Puget Sound area" by Ralph A. Watson, assistant geologist, Great Northern Railway Co.; "British Columbia" by Hartley Sargent, chief of the Mineralogical Branch, British Columbia Department of Mines; and "the Lower Columbia River Basin" by A. O. Bartell, managing engineer, Raw Materials Survey Inc.

Factual information gathered for presentation in the papers was obtained as largely as possible from wholesalers, primary suppliers and principal consumers in the various areas. Information contained in the four papers is the most up-to-date available for the area. Without exception, each area reported large and rapid increases in the production and consumption of all classes of industrial minerals. This expansion of industrial economy has been the direct result of the phenomenal increase in population.

Gypsum

Inland Empire, which produces the only magnesite in the northwest and leads the United States in its production, consumes little or none of it within the area. Steel mills in the east use the material as a refractory in the form of "dead-burned" magnesite. Gypsum is becoming increasingly important with two firms now in production. Laucks Chemical Co. expects to produce between 4500 and 5000 tons in 1951 from its Okanogan county deposit. Epsom salts are also produced from the same deposit. Columbia Gypsum Products commenced operation of its plant at Greenacres, Wash. during the latter part of 1950. Gypsum is imported from the company-owned deposit at Windermere, B. C., said to contain some of the purest material in the world. Partition tile, wallboard, and gypsum lath are produced, and expectations are that 100 tons will be produced daily.

Fertilizers

Stauffer Chemical Co. is constructing a plant at Tacoma to produce 35,000 tons of triple superphosphate annually. Waste SO_2 gases from the American Smelting and Refining Co. smelter at Tacoma will be used. Manganese Products Co. of Seattle produces some fertilizers by sintering a mixture of olivine and phosphate rock. Washington producers shipped a total of 89,000 tons of mixed fertilizer during 1949. The Puget Sound area pulp industry annually consumes 10 percent of the limestone used, 90 percent of the salt cake, 7½ percent of the sulfur, 13 percent of the chlorine, 5 percent of the soda ash and 8 percent of the caustic soda.

British Columbia, which saw its first permanent white settlements little more than 100 years ago, now produces nearly $9,000,000 of industrial minerals annually. Cement, sand and gravel, and sulfur account for the bulk of the value. Due in part to the ruggedness of the terrain which imposes transportation difficulties, most of the industrial minerals produced in the area are for local consumption. Limestone is available in large quantity in many parts of the province. There is a big deposit of magnesite near Cranbrook, and large reserves of diatomite are known along the Fraser River south of Quesnel. Chrysotile asbestos, of great importance during the present emergency, has been discovered in the province. A deposit is being analyzed southeast of Revelstoke.

The Lower Columbia River Basin, long dominated by the resinous atmosphere of an economy based on timber, is slowly but steadily developing its industrial minerals. In the period from 1939 to 1949 the value of industrial minerals produced in Oregon alone jumped from $4,000,000 to $18,000,000, and the trend is still continuing. Sand and gravel, as might be expected, contribute the greatest source of wealth of all the industrial minerals produced. Approximately half of the 11,000,000 cu. yd. produced annually go into government projects, principally flood control and power dams. Brick and tile are produced from 19 plants in Oregon, cement is produced at three plants, lightweight aggregates are processed by six pumice producers, two expanded shale kilns and one perlite popping and wallboard plant.

Oregon Sand Deposits

The black sand deposits of the Oregon coast, which have long attracted the attention of numerous operators, were summarized by George W. Gleeson, dean of the School of Engineering and Industrial Arts, Oregon State College. Chromite contained in the sands constitutes the principal mineral which might be recovered. A total of 3,000,000 long tons of sand containing not less than 4 percent Cr_2O_3 with 1.8:1 chrome-iron ratio could perhaps be produced. Only in extreme conditions of national emergency when all other sources were curtailed would this source of chromite be considered because of high beneficiation charges. By-products might possibly include zircon, rutile, monazite and the noble metals. Two concentration plants operated for a short time during World War II under government contracts.

Detroit Dam

The Detroit Dam aggregates plant, as described by Woodrow L. Burgess, construction engineer, Corps of Engineers, U. S. Army, revealed the latest techniques used in the production of concrete aggregate for large monolithic dam structures. The dam is a straight gravity-type concrete structure which when completed will have an overall length of 1550 ft. and a height of 454 ft. from roadway crest to the lowest point of the foundation. Three million tons of aggregate will be produced to supply the requirements for 1,400,000 cubic yards of concrete. Located about 50 miles east of Salem, Oregon, on the North Santiam river, the dam will provide power and flood protection for the populous Willamette valley (see ROCK PRODUCTS, October, 1950, page 90).

Concrete Masonry

One of the knottiest problems that has faced concrete block producers has been the shrinkage of pumice aggregate precast units. J. J. Wegner, Jr., chemical engineer, Division of

*Chairman, Northwest Industrial Minerals Conference

Industrial Research, State College of Washington, Pullman, in his paper "Dimensional Changes in Unit Masonry," outlined the findings of the division during its extensive research into the problem. Pumice aggregate block, while nothing really new, came into widespread use during and immediately after World War II. Pumice block have good insulation qualities, can be sawed readily and have good nailability. Acoustical properties are superior to standard sand and gravel units and fire resistance is excellent. Vast deposits of granular pumice in central Oregon, located close to both rail and highway transportation, offer the concrete masonry industry an abundance of excellent material at reasonable cost. "Cracking" of finished pumice block structures has discouraged builders from making the greatest use possible of the lightweight block, however.

The problem was attacked by making a prolonged study of the relationship between moisture and dimensional change at constant temperature. Test walls of standard 8- x 8- x 16-in. 3-core block, obtained from commercial block plants, were erected with both standard sand and gravel block and pumice aggregate units. For the long term tests the panels were placed in a room equipped with humidity and temperature control equipment. Temperature was maintained at 85 deg. F. and relative humidity ranged from 20 percent up to near saturation. Dimensional changes in the panels were checked at 12 points in each panel with a 3⅝-in. dial indicator graduated to .001 in. The efficacy of patented wire joint reinforcement materials was also tested in additional panels. Accelerated tests on single block were run, but on a wet vs. dry basis only.

Panels were inspected closely for signs of cracking. First cracking was detected 97 days after the panels were placed in the test room. Cracks that were readily visible during the low humidity cycles disappeared during the water spray periods. A few of the largest cracks failed to close once they had formed, however. Dimensional changes were found to take place quite rapidly with changes in humidity, particularly during humidity increases. This was probably due to the comparatively rapid rate of increase in moisture content as opposed to the slower rate of loss during the drying cycle. In the individual block used in the accelerated tests it was found that approximately 90 percent of the dimensional change occurred in a few minutes while the block were being immersed.

Conclusions reached as a result of the tests indicate that for an equal atmospheric humidity change, (1) the pumice block have greater dimension change than the standard gravel aggregate units, (2) the pumice block seem to exhibit a more rapid rate of change than the regular units, and (3) the maximum dimension change below the 40 percent block moisture content level for the pumice aggregate block was 0.750 in. per hundred feet contraction. One interesting fact discovered during the accelerated tests was that the permanent change had apparently all taken place within about 45 days. The use of wire reinforcement laid in the mortar joints provides considerable restraint on the horizontal dimension change of pumice aggregate panels.

Flotation

James A. Barr, Jr., research chemist, Armour & Co., in his talk "Recent Advances in Minerals Beneficiation," revealed how radioactive atoms are now aiding industry. "Tagged" atoms, obtained from the Atomic Energy Commission, are used to trace the paths of various components in flotation feed. Formerly this was a very difficult task but with radiation detecting equipment it has become relatively simple and rapid. Another interesting feature in flotation research is the occasional accidental discovery of a suitable reagent which works perfectly but for no readily apparent reason. It often requires painstaking "Edisonian" research to discover the reasons why one reagent works while another closely similar one does not. Mr. Barr supplemented his talk with a high-speed motion picture showing the flotation process in action.

Minerals Uses

At the noon luncheon, held in the Mirror Room of the Portland Hotel, Richard J. Anderson of Battelle Memorial Institute briefly enumerated some of the newest uses for the important industrial minerals. Following this the guests were taken on a Kodachrome tour through the numerous laboratories of Battelle, an industry-sponsored research organization located at Columbus, Ohio.

Asbestos

With the technical sessions cleared away, delegates relaxed at a cocktail party which blended eventually into the evening banquet. Dr. A. B. Cummins, research director, Johns-Manville Co., and chairman of the Industrial Minerals Division of A.I.M.E., gave the principal address of the evening on "Asbestos—a General Review." Dr. Cummins described the various types of commercially used asbestos, emphasizing that the amphibole type of material is steadily assuming a more important place in the industry which has relied largely upon chrysotile fibers in the past. Although the United States leads the world in the consumption of asbestos it must depend almost entirely on material imported from Canada. The eastern Canadian asbestos deposits extend in a southwesterly belt of considerable length which stops almost exactly at the U. S. border. The one domestic deposit of any economic importance in this country is located at the very southernmost top of this belt in northern Vermont. A color film which traced the various stages in the processing of asbestos, produced by Johns-Manville, rounded out Dr. Cummins' talk.

Plant Inspections

No conference would be complete without plant tours, so on Saturday 35 rain-repellent delegates visited Smithwick Concrete Products' Haydite plant. The plant features the largest rotary kiln, measuring 100 feet in length by 8 feet in diameter, used in the industry. Fossiliferous shale brought in 40 miles by rail is expanded to produce lightweight aggregate. At the Mixermobile Manufacturing Co., guests were shown through the large plant where various types of earthmoving and concrete-mixing equipment are manufactured. Of particular interest was the radial three-cylinder steam engine being built to power a large earthmoving unit. Estimates by the group of the time required to "fire-up" the radical departure from standard motive power ranged from several hours to 10 min., but the designers believe that 40 sec. will be sufficient. Last stop for the day was at the Oswego plant of the Oregon Portland Cement Co. Raw material is obtained from two sources, widely separated. High grade limestone is shipped from Lime, Oregon in the eastern part of the state while a low grade limestone is quarried at Dallas in the Willamette valley.

Industrial Sand Meeting

(Continued from page 64)

ity. The opinion was expressed that we should not withdraw from the United Nations but that we would if Red China gains admittance. The world cannot stand another war.

In conclusion, Mr. Ahearn said that the most important asset of this country is the individual character of the American people.

Entertainment

There being some 35 ladies present, a delightful program of entertainment was provided. A bridge-tea was conducted on the opening afternoon and golf tournaments, with appropriate prizes, were conducted for both men and women. As per custom, cocktail parties and bingo games comprised the evening entertainment and a special feature was a picnic for all in attendance as guests of the association.

Cement Plant Expansion

ALPHA PORTLAND CEMENT CO., Easton, Penn., recently announced plans to expand facilities at its Jamesville, N. Y., plant. Plans call for increasing the plant's capacity to 1,000,000 bbl. of cement annually. MacDonald Engineering Co., Chicago, Ill., has been awarded a general contract for the construction. The new facilities are expected to be in operation by 1952.

ON BLENDED CEMENTS

THE EDITOR: I have studied the discussion of S. W. Benham's paper (May issue of ROCK PRODUCTS, p. 96) by Mr. Rockwood with considerable interest and care. His discussion includes several good points, but there are many of the statements and conclusions with which I do not agree.

The statement that modern portland cements may be improved is certainly true. Improvements *are* being made, an example being air entrainment, which is now being applied widely. There is certainly no reason to believe that future improvements may not be made. I have never, however, gotten the idea that the cement industry believed their product to be "nearly perfect" as stated by Mr. Rockwood. The vast amount of work done by the cement industry itself in the fields of air entrainment, low alkali cements, pozzolanic materials, the Long Time Study of Cements, etc., would indicate that the industry is not only cognizant of the possibility of improving its product, but desires to do so. The position of the cement industry, in my opinion, is that its product is the best it knows how to make, at the present time, at a price the consumer is willing to pay. It should be noted that any changes in ingredients or processing to improve the quality of cement will, in all probability, be directly reflected in increased cost of the cement, which is already by far the most costly ingredient of concrete. In other words, improvement in the cement is just as much an economic problem as is the question of what aggregates should be acceptable.

It is certainly "silly and futile to seek the *perfect* aggregate in parts of our country where such is not economically available." But isn't it just as futile to seek the *perfect* cement which probably would not be economically available in any part of the country? The logical approach is to develop sufficient information and proper tests for both cement and aggregates that will enable us to select the *best* of each material that is economically available. If, as Mr. Rockwood points out, we are forced to use less acceptable aggregates in the future, then the problem of selecting the *best* one that is available is even more critical.

To "adapt" cements to the aggregates, as suggested by Mr. Rockwood, is not a logical general procedure. The great variety of aggregates and the numerous aggregate problems would undoubtedly lead to a multiplicity of cement types, each to be used with a particular aggregate or to combat a particular aggregate problem. Any increase in the number of types of cement, restrictions on the already limited sources of suitable raw materials, or increases in the complexity of manufacture will result in increased cost. Certainly we cannot introduce the specialization that would be required to make cement a cure-all for aggregate defects without exceeding the economic limit on its cost.

Mr. Rockwood is correct in stating that the water alone may be responsible for concrete failures. Water is necessary for destruction by freezing and thawing, wetting and drying, alkali-aggregate reaction, etc. It is also true that concrete in interior walls, etc. does not deteriorate from lack of durability, for it is not exposed to either weathering or water. The vast majority of the concrete in use is, of necessity, exposed to both.

The equivalent of linear expansion of water as calculated is in error. If A = linear coefficient of expansion, B = coefficient of volume expansion, and t = temperature change then

$$B = 3A + A^2t + A^3t^2$$

Since A is very small, A^2 and A^3 are so small in numerical value that these terms may be neglected. The value of A then is $\frac{1}{3}B$ not the $B^{1/3}$ as Mr. Rockwood assumed. This calculation results in a value of 87.3×10^{-6} instead of 6.4×10^{-6} per degree C.

Use of this value would indicate much higher expansion of the water than Mr. Rockwood considered. However, the situation is not as severe as might be imagined from the description given. The mobility of the water is actually an advantage, not a disadvantage as stated in the paper. The temperature changes which cause expansion of the water take place slowly and the mobility of the water enables it to escape instead of building up great pressures. The same pore system that makes it possible for the water to enter concrete makes escape of the water possible.

It is possible to destroy wet concrete by alternate heating and cooling. Several laboratories have conducted such tests, including the Joint Highway Research Project and the National Sand and Gravel Association. However, temperature changes far more rapid and severe than those encountered in nature are necessary to cause deterioration. Another item of interest in these tests was the fact that the rate of deterioration varied with the aggregate, from almost no effect with good materials to rapid disintegration with the bad aggregates. This indicates that the water in the aggregate, *not* that in the cement paste, was the cause of the deterioration.

Apparently Mr. Rockwood would consider all of the water in concrete —both "free" and "combined"—as contributing to dangerous expansion. Even though the combined water may be nothing more than water firmly held in the finest pores and capillaries of the cement gel, it cannot be considered to be the equivalent of the free water. The forces which hold absorbed water in thin films on surfaces and the water in the finest pore space are so powerful that the characteristics of the water are changed. It loses its mobility or fluidity, cannot be frozen or evaporated under any ordinary conditions. The usual properties of water are lost, and it becomes an entirely different material than the free water.

We are in agreement that water retained in fine grained aggregates is the reason some of them are objectionable as aggregates, but the statement that even the worst does not contain as high a percentage of water as concrete is in error. Mr. Rockwood expresses the water in concrete on a percentage by *volume* basis, and indicates such values to be around 10 percent. The absorption of aggregates is usually computed on a weight basis. Therefore, to obtain comparable figures we must multiply the usual percentage absorption value for the aggregate by its specific gravity. Such a calculation of absorption, as a *percentage of the total volume*, shows that we have several aggregates in Indiana with absorptions of 15 to 20 percent. This water is *free* water and is certainly higher than the average for concrete as a whole.

Mr. Rockwood states that we do not need freezing and thawing tests of such water-saturated concrete and aggregates, that alternate wetting and drying will cause the same kind of disintegration. While it is true that wetting and drying will cause disintegration of some concretes, the deterioration is *not* necessarily the same as that produced by freezing and thawing. For example, concrete made with some Indiana aggregates is destroyed by only a few cycles of freezing and thawing, but is unaffected by alternate wetting and drying. In other sections of the country materials may be found that are affected to a greater extent by the wetting and drying cycle than by freezing. Since concrete used throughout the northern part of the country is going to be exposed to freezing and thawing it would seem both reasonable and necessary to test for resistance to that type of exposure.

Drying of objectionable aggregates before use is certainly desirable. The fact that pavements built with such aggregates do not usually show any deterioration for 6-8 years, however, would indicate that water absorbed *after construction* is the dominating factor, rather than the initial water contained in the material. If the initial water content were entirely responsible for the trouble, deterioration should be evident in a much shorter time. Therefore, it seems probable that drying such aggregates before use will extend the life of concrete and delay the deterioration, but not eliminate it completely.

Drying of the concrete itself would likewise be of some benefit. Another factor that undoubtedly helps concrete laid in the spring as compared to that placed in the fall is the greater

more hauls, lower maintenance costs

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strength from the longer curing period before the first cycles of freezing and thawing.

Mr. Rockwood's statement that anything which reduces the retained or absorbed water in concrete is a step in the right direction is certainly correct. However, we cannot keep all of the water out of concrete; selection of materials which can withstand the action of the water that is present is, therefore, an equally important step in the right direction.

In general, it seems that Mr. Rockwood's papers and discussion tend toward two main ideas:

a) that durability factors, such as porosity and absorption, should be considered only for the concrete as a whole—not for the individual materials in the concrete, and
b) that we should concentrate research on the problem of producing cements that will make up for shortcomings and defects of the aggregates.

The end point of these ideas—better concrete—is fine, but the ideas themselves are rather idealistic. We do not judge the strength of a chain by the average strength of the links; the quality of the poorest one governs the value of the whole. The same is true of concrete—average values will not show whether or not any one of the materials is weak, inferior and subject to failure. Whether we are making a cake or concrete, we cannot logically expect one ingredient of superior quality to completely overcome the effects of a rotten one somewhere in the mix.

A much more practical and realistic approach than that of Mr. Rockwood, is to:

a) recognize that poor concrete may be due to any *one* or any combination of the factors of cement, aggregate, and construction practices—inferior quality in any of them may cause failure even though the "average" is high;
b) through research, learn enough about the qualities and characteristics of *all* the materials used in concrete to be able to determine the relative qualities of the available materials;
c) for any given job, select for use the best economically available cement, the best economically available aggregates and the best economically available construction practices.

We cannot expect perfection or "cure-all" properties in any material; but, through the steps outlined above and by research and experience with all materials, we can assure ourselves of the *best economically available concrete* for a given job.

D. W. LEWIS,
Research Engineer,
Joint Highway Research Project,
Purdue University Engineering Experiment Station.
Lafayette, Ind.

Labor Relations Trends

(Continued from page 43)

any aid or protection from respondent. That was the sole function of C.T.T.U., the duly selected and existing bargaining representative for the unit of which the involved employes were a part. The Board in its brief concedes, 'These agreements (those between respondent and C.T.T.U.) bound the employes to work in conformity with the wages, hours, and working conditions provided in them. Employes dissatisfied, for example, with their wages were not entitled to seek to revise them by strike action, before the expiration of their agreements.' In other words, these employes were without right to bargain with respondent or to strike because of any grievance which they had or for their own aid or protection, but they had such right, according to the Board, in behalf of employes of a different unit and represented by a different bargaining agent.

"So far as we are aware, no court has passed upon the precise question here involved; however, there are numerous cases where it has been held under a variety of circumstances that concerted activities by a group of employes were not protected by §7 of the Act." (Here follows a discussion of several relevant decisions).

The Court's decision resumes: "The Trial Examiner [of the N.L.R.B.] in his findings, referring to the refusal of the involved employes to cross the picket line, stated: 'By so doing these eight employes placed themselves in the position of sympathy strikers who made common cause with those engaged in the economic strike against their common employer. As a result, their legal status became identically that of the striking employes of the I.T.T.U. state unit, namely economic strikers.' We think it is a novel theory that the mere refusal to cross a picket line, in the absence of any other activity, makes the one who refuses a party to the strike, but even so, as already shown, such refusal was not for the 'mutual aid or protection' of the employes involved. It could have only been for the benefit and aid of those in a different bargaining unit, the representative of which could not have represented the involved employes and, consequently, could have obtained nothing from respondent for their benefit.

"The unreasonableness of the Board's decision is emphasized by its order wherein respondent is directed to cease and desist from 'interfering with, restraining, or coercing its employes in the exercise of the right to self-organization, to form labor organizations, to join or assist Illinois Traffic Division 14, Communications Workers of America, successor of Illinois Telephone Traffic Union, N.F.T.W., or any other labor organization, to bargain collectively through representatives of their own choosing, and to engage in concerted activities for the purpose of collective bargaining or other mutual aid or protection, or to refrain from any or all of such activities. * * *'

"Other than the incidents which we have discussed, there is not a scintilla of proof that respondent interfered in any form or manner with the right of its employes to join a labor organization of their own choice, or that it refused to bargain collectively with the agents selected by such employes. In fact, the record indisputably demonstrates that respondent bargained with C.T.T.U. in good faith, with a resultant contract, and it also bargained with the striking union, with a like result. There is no evidence of any hostility or favoritism on behalf of respondent against or for any union. Aside from what we have heretofore said, the Board is not entitled to enforcement of the broad, sweeping terms of the order presented. * * *

"The petition for enforcement of the Board's order is denied."

Handling Large Tonnages

(Continued from page 59)

has been sufficiently deslimed to permit re-use of the water in the plant. The big thickener operates at one revolution per 15 min.

Water is secured from Jett Canyon supplemented by two deep well pumps located in Smokey Valley west of the mill. These supply 1000 g.p.m. and 2000 g.p.m. respectively, by means of deep well pumps made by Wintroath Pump, Inc. Both deliver to a surface storage tank where a two-stage Fairbanks-Morse centrifugal pump delivers to the mill storage tank through a 14-in. pipe line.

The 2000-g.p.m. deep well pump is driven by a Fairbanks-Morse 100-hp. synchronous motor through an Electric Machinery Manufacturing Co. magnetic clutch. The clutch permits continuous speed changes up to 1750 r.p.m. The pumping system is entirely automatic and functions by means of a Regutron Electric speed control and storage tank float system so that no attendant is needed at the pump, which is located about a mile from the main plant.

Electric power is used throughout with the exception of the two previously mentioned 54-B draglines. Electricity is purchased from the California-Nevada Power Co. over a 55,000-volt, 3-phase, transmission line that is 14 miles long.

Personnel

Round Mountain Gold Dredging Co. is affiliated with the Yuba Dredging Co. and the Yuba Manufacturing Co. William C. Browning, 1211 Pacific Mutual Building, Los Angeles, Calif., is vice-president and consulting engineer.

At Round Mountain Edwin H. Oshier is field superintendent and Jim Perkins is pit foreman.

Promoting Agstone Sales

NATIONAL AGRICULTURAL Limestone Association, Inc., as a means of promoting limestone sales, has designed a new combination blotter-calendar for mailing to farmers to call their attention to the need for agricultural limestone and, at the same time, suggest to them the name of their local aglime supplier.

Feldspar

IN THE MINING FIELD much activity for 1951 is anticipated for Salida and Chaffee county in Colorado. The building of three feldspar and fluorspar mills, a proposed custom manganese mill, and the stepping up of gold,silver, lead and zinc ore production are expected to aid the government's strategic mineral stockpiling program.

The Western Feldspar Milling Co. is putting the finishing touches on a new $100,000 mill located at the northwest corner of Salida. Other companies, either in the process of construction or renovating, are Fluorspar, Inc.; C&L Mining Co.; General Chemical Co.; Salida Calcium Co., and Manganese of Colorado, Inc.

MRO Amended to Permit Increased Quotas

EFFECTIVE MAY 22, 1951, the National Production Authority amended N.P.A. Regulation 4, covering the use of the "DO-97" defense order rating for maintenance, repair and operating supplies and for minor capital additions.

National Crushed Stone Association has summarized the changes that are of especial importance, as follows:

1. The use of a DO-97 rating for up to 120 percent of the amount spent on MRO items during the base period is now permitted, the previous limit being 100 percent.

2. Any organization that uses the DO-97 rating to get 20 percent or less of its quarterly quota will also be permitted to purchase an unlimited MRO total without use of the rating, subject to inventory and use limitations and any restrictions contained in other N.P.A. orders. Heretofore, if a firm used the DO-97 rating at all, it was limited to an overall total of 100 percent, rated or unrated, of its base period use.

3. The amended order permits a choice of base period: either the calendar year or the nearest fiscal year ending before March 1, 1951.

4. DO-97 use for capital additions is limited to 10 percent of the quarterly quota or to $750, whichever is higher.

5. Companies which have more than one plant within the United States and its territories and possessions now have the option of deciding whether MRO quotas shall be established for each plant individually or for the organization as a whole. Previously, quotas were on a single-plant basis.

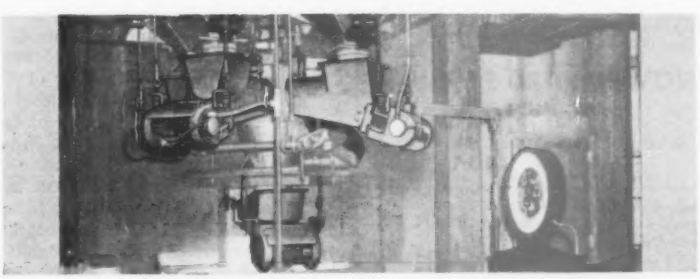
Fast, Economical, Modern Handling Of Rock Products

From Light, Fine Powder to Heavy, Coarse Chunks

SYNTRON
VIBRATORY EQUIPMENT

ELECTRIC VIBRATORS . . . Assure free-flow of materials from bins, hoppers and chutes—3600 vibrations per minute break down arching and plugging of stubborn materials. Save manpower—eliminate the pounding, rodding and poking that damages bins and hoppers and wastes time and materials.

VIBRATORY FEEDERS . . . Controlled rate of flow gives smooth, even feed of materials—Feeding heavy abrasive ore to dryers—Materials to Ball Mill in Cement Plant—Rock from dump truck to crusher—Discharge from Coke Rod Mill to conveyors—Clay to Pan Mill in Refractory—Lime from kilns in the manufacture of mortar, etc.



BATCH WEIGH PLANTS . . . Accurate, automatic weighing of multiple batches for mixing by remote push button control is achieved through automatic, scale-controlled operation—fast feed—slow dribble—and instantaneous cut-off.

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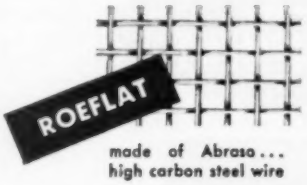
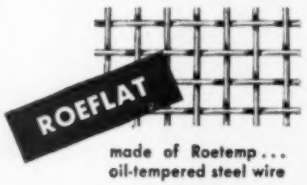
SYNTRON COMPANY
450 Lexington Avenue — Homer City, Penna.

AGGREGATE WIRE SCREENS

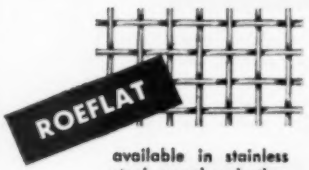
Roebling offers the right metal or alloy for extra economy



made of Abraso... high carbon steel wire



made of Roetemp... oil-tempered steel wire



available in stainless steel, monel and other alloys

WHETHER ROEBLING ROEFLAT or some other construction best meets your screening requirements, Roebling goes a long step farther... offers you each and every construction in the exact metal or alloy to bring maximum screen life and economy in your operations.

As one example, the vastly increased working life afforded by Roebling Roeflat's unique construction can be boosted still further by adopting Abraso, for its high resistance to vibration fatigue; Roetemp, for abrasion and fatigue resistance; stainless steel, monel or other alloys to overcome corrosion problems.

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WOVEN WIRE FABRICS DIVISION

John A. Roebling's Sons Company
Roebling, New Jersey

Woven Wire Fabrics Division
John A. Roebling's Sons Co., Roebling, N. J.
Gentlemen: Please send me free copy of Catalog W-903 giving up-to-the-minute information about Aggregate Screens.

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Company.....
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ROEBLING

Cement Production Overseas

DESPITE THE INCREASE in the production of portland cement in Ecuador in 1949, the 1949 production represents only about one-fourth of the potential demand. Reconstruction activities in the earthquake area have increased the demand considerably. At present, Cemento Nacional is the only cement company in Ecuador. Due to the cement shortage, two companies have made plans for new plants. The Corporacion de Fomento (government) has made extensive plans for a plant near Riobamba. A group of business men has proposed building a cement plant in the Province of Guayas.

VENEZUELIAN CEMENT PRODUCTION continued to reach new highs, the output in the first 5 months of 1950 averaging 36,840 metric tons, compared with 24,976 tons monthly for the entire year of 1949. Although domestic production has increased steadily in volume, industrial demand has exceeded domestic output and necessitated substantial imports. In the period January through April, imports averaged above 31,900 metric tons monthly with Puerto Rico, Germany and Italy being the principal exporters. With the steady improvement in domestic producing capacity, the privilege of duty-free importation of portland cement afforded importers since 1942 was discontinued in January, 1950. There are now six cement plants in Venezuela.

CIMENTERIE D' ALBERTVILLE is a new cement company in the Belgian Congo, formed September 29, 1950, as a Congolian limited-liability company with a capital of 40,000,000 francs. Albertville, Katanga Province, is to be the local headquarters, with administrative headquarters in Brussels. The plant will be erected at Kabimba, near Albertville and will have a capacity of 30,000 tons of cement per year. Imports of cement and lime in the first half of 1950 totaled 34,638 metric tons.

CEYLON'S new government-owned cement plant at Kankesanturai was officially opened September 21, 1950. The estimated annual output of the plant is 100,000 tons—enough to meet the present requirements for cement on the island. The Minister of Industries said that the cost of production would be such that the price of cement would be below the cost of imported cement delivered at Colombo.

INDIAN CEMENT PRODUCTION in 1949 is reported as 2,000,000 long tons with an installed capacity of 2,803,000 tons, compared with 1,516,000 tons produced in 1948 with an installed capacity of 2,115,000 tons and an output of 1,441,000 tons and capacity of 2,075,000 tons in 1947.

The Ministry of Industry and Supply of the government of India decided to remove movement control in the country on imported cement now lying at the Indian harbors.

INDONESIAN CEMENT will benefit from the development and reconstruction planned to cover a 5-year period. The $100,000,000 Export-Import Bank loan to the country for reconstruction projects includes plans for cement plants. Exports of portland cement in the first half of 1949 totaled 88,217 metric tons, gross weight. The largest amounts of this went to Japan, Belgium and Luxembourg.

THE BERIRA, MOZAMBIQUE, CEMENT PLANT was expected to begin producing by summer, 1950. The plant is being constructed by the Companhia de Cimentos de Mozambique and is expected to produce about 60,000 tons of cement annually.

PORTUGAL'S FIRST white cement plant was opened officially in February, 1950. The plant, constructed by "Companhia de Cimentos Brancos-Cibra," in Pataias in west-central Portugal has a normal production capacity of 40,000 tons a year and a maximum capacity of 60,000 tons. Normal consumption of white cement in Portugal is 10,000 tons. All raw materials are obtainable locally.

WHITE'S SOUTH AFRICAN PORTLAND CEMENT CO., LTD. plant at Lichtenburg, Union of South Africa, a recently completed plant, has started delivery of cement to all parts of the Union. The plant is said to be one of the largest and most modern in the southern Hemisphere.

These reports were taken from *Mineral Trade Notes*, November and December, 1950, issues.

Textbook on Construction and Allied Operations

A PRACTICAL TEXTBOOK on the tools of the civil engineering profession, including production of aggregates and concrete, has recently been published. The book, "Automotive and Construction Equipment," was written and published by LCDR C. W. Lindgren, Civil Engineer Corps, U. S. Navy. Written in a clear, easy-to-follow style, the 33 chapters of the book take a practical approach to basic problems of the construction and transportation industries. It begins with the duties and functions of the driver, the mechanic, the shop supervisor, the operations manager and the dispatcher. In dealing with automotive equipment, the author advises on the soundest methods of truck and fleet operations and describes the operational features of both diesel and gasoline engines, fuels, lubricants, service instructions and maintenance procedures. Advice is also given on record-keeping for cost and performance.

As an experienced operator and contractor, the author outlines the most economical and efficient practices in the use of hoisting machinery, tractors, graders, rollers, trenching machines, air compressors and paving equipment. Information is also given on hauling, grading, concrete, asphalt, stabilized mix, water-bound macadam paving, gravel pit operations, rock quarrying and crushing, bridges, cais-

sons, trenches, monolithic drainage systems, soft- and hard-rock tunneling, airports, buildings, railroad yards, viaducts and deep-water construction.

Priced at $4.50, copies of the book may be obtained by addressing the author, Box 3620, Washington 7, D. C.

Perlite Fire Rating

GREAT LAKES CARBON CORP., New York, N. Y., has announced the development of a 6-in. perlite curtain wall which has received a 4-hr. fire rating from the Underwriters' Laboratories, Inc. The Underwriters' test was sponsored jointly by Aluminum Co. of America, McNulty Brothers Co. and Great Lakes Carbon Corp.

The wall consists of an exterior layer of perlite-portland cement plaster, 4 in. thick, and an exterior layer of perlite-gypsum plaster, 1 in. thick, separated by a furring channel. It is claimed that this curtain wall is less than half as thick and weighs about one-fourth as much as a conventional wall, saving at least 10 percent over conventional construction costs.

Approve Pension Plans

STOCKHOLDERS OF IDEAL CEMENT CO., Denver, Colo., at their recent annual meeting, approved pension plans for both hourly and salaried employes, as developed by management during the latter part of 1950. In a supplemental report to stockholders, the company pointed out that although production and shipments so far in 1951 are running ahead of the same period for 1950, net earnings, because of the present tax structure, are not expected to be greater than last year and may be even less.

All the present directors were reelected at the meeting. They are: C. K. Boettcher; Cris Dobbins; Charles Boettcher II; Adolph Coors; A. E. Humphreys; M. O. Matthews; A. G. Rydstrom; H. C. Van Schaack and H. O. Warner.

Highway Construction

U. S. HIGHWAY CONSTRUCTION is expected to run close to normal volume in 1951, according to a recent report in *Engineering News-Record*. Construction expenditures for highway work put in place, for the first three months of 1951, amounted to $285,000,000—16.3 percent above the same period for 1950. Contract awards by state highway departments were also slightly higher. This year's state highway awards, including both federal-aid and non-federal-aid roads, totaled $267,000,000 in the first three months, $5,000,000 higher than for the corresponding period of 1950.

On the federal-aid program alone, construction was in progress, at the end of March, on more than 3400 projects costing more than $1 billion. Also, 1951 spending for highway maintenance is expected to equal or surpass last year's $1.35 billion.

Specify "SUBWAY"®

FOR LONGER SERVICE ON THE TOUGHEST JOBS!

"SUBWAY" AIR HOSE is made to provide highest resistance to all service hazards encountered in the roughest drilling operations. Perfectly balanced wrapped duck construction assures equally long life for tube, carcass and cover, with each part contributing to the outstanding strength, toughness and durability for which this hose is famous. Despite its exceptionally husky build, it is light in weight, flexible, easy to handle. A Goodall "Standard of Quality" product.

® Sizes ½" to 1¼" I.D., maximum lengths of 50 feet.

Contact our nearest branch for complete information on "Subway" and other Goodall hose, belting, boots and clothing . . . recognized everywhere for outstanding quality and reliability.

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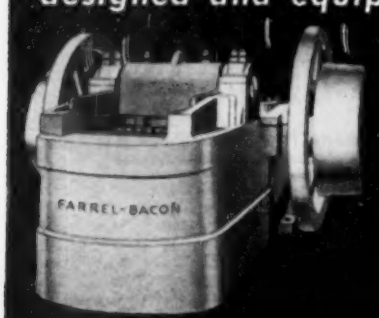


Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10" x 7" *Write for complete information.*

FARREL-BACON
ANSONIA, CONNECTICUT

BA 5

MANUFACTURERS NEWS

Pioneer Engineering Works, Inc., Minneapolis, Minn., has announced the election of Melvin Ovestrud as president of the company. He was formerly first vice-president and succeeds Lewis W. Yerk who has retired but who will continue active in the business as a member of the board of directors, the executive committee, and as management consultant. Eugene C. Bauer, president of Poor & Co., Chicago, has been elected chairman of the board. K. E. Brunsdale has been promoted from vice-president to first vice-president; O. J. Ellertson from treasurer to vice-president; and Carl R. Rolf from assistant secretary to vice-president. Roy W. Sergeant, Chicago, has been elected treasurer and assistant secretary; A. J. Frystak, Chicago, has been named secretary, and Roy L. Slama has been appointed assistant secretary and assistant treasurer.

Melvin Ovestrud

Mr. Ovestrud, who started as superintendent of Pioneer Engineering Works in the early days of organization, has been actively interested in the management of the company, with emphasis on production and engineering. In 1936 he was elected vice-president and a member of the board of directors. In 1942, he also became works manager. He had been first vice-president since January, 1951. Prior to his association with the company, Mr. Ovestrud was in charge of all production matters for the Twin City Forge & Foundry Co.

Flexible Steel Lacing Co., Chicago, Ill., announces that J. W. Gillespie, representative for Texas, Louisiana, Arkansas and Oklahoma, has been recalled to active military service. He is a captain in the 443rd Communications Squadron of the Air Force and at present is stationed at Hensley Field, Dallas, Texas.

Blaw-Knox Co., Pittsburgh, Penn., has announced the appointment of T. D. Harter as Eastern district sales manager of the clamshell bucket department of the Blaw-Knox Division, with headquarters at Philadelphia.

Eagle Iron Works, Des Moines, Iowa, has appointed Coast Equipment Co., San Francisco, Calif., as sales and service representative for the Eagle line of sand, gravel and ore washing equipment.

Ross Operating Valve Co., Detroit, Mich., announces that Russell J. Cameron, former vice-president in charge of sales, has been elected president of the company to succeed John Sainsbury who will remain as an active consultant and member of

the board of directors. W. E. Hennells has been named vice-president and L. M. Blomgren, secretary and treasurer.

Link-Belt Co., Chicago, Ill., has announced the appointment of Robert W. Suman as chief engineer of the Philadelphia plant in addition to his duties as chief engineer for power transmission products. He succeeds William S. Campbell, who has retired from active duty.

Signode Steel Strapping Co., Chicago, Ill., announces that J. M. Moon has been elected vice-president of the company in addition to his duties as director of sales. He became associated with Signode in 1934 and subsequently was made manager of the field engineering department. In 1947, he was appointed general sales manager, and two years later was named director of sales. Robert Peterson has been elected assistant treasurer.

Eriez Mfg. Co., Erie, Penn., has announced the election of O. F. Merwin, president and founder of the company, as chairman of the board of directors. He will be succeeded as president by R. F. Merwin, general manager. O. F. Merwin founded the company in 1942 when he was 70 years old. From his experience as a manufacturer's representative selling to the milling industry, he knew that there was need for a low cost, efficient magnet to remove iron and steel particles from materials in process. He found the right magnetizing agent, designed a tramp iron separator, and sold it to the milling industry. Today at 79 he is still selling to the industries.

R. F. Merwin

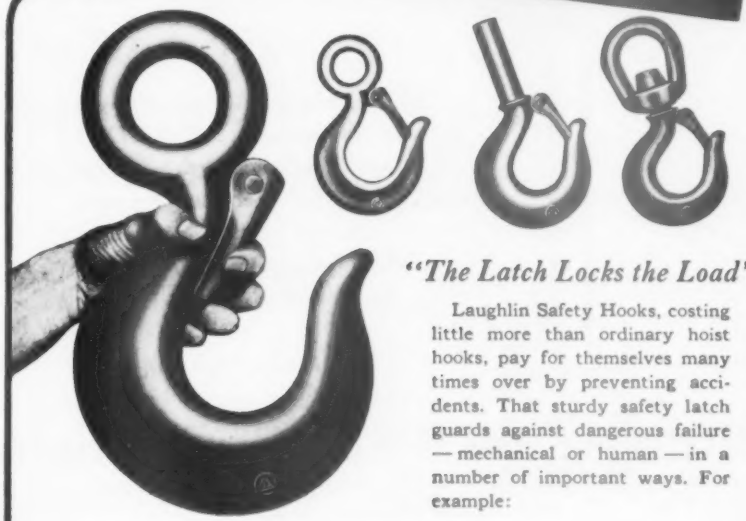
R. F. Merwin received his B.A. degree from Hiram College in 1936, and worked as a correspondent for the Associated Press, United Press, and Cleveland Plain Dealer while still in college. Following that he was an editorial writer for the Erie Dispatch Herald, and priorities director of the Parker White Metal & Machine Co. He joined Eriez as sales manager and subsequently became vice-president and then general manager.

The Timken Roller Bearing Co., Canton, Ohio, has appointed Norman H. Peterson as assistant advertising manager. A graduate of the University of Illinois, Mr. Peterson served three years with the finance department of the Army before joining Timken as a copywriter in 1946.

The Foxboro Co., Foxboro, Mass., announces that the new assembly building, which is nearing completion, will add 50,000 sq. ft. to the working area. The new building will be used principally for the final assembling and testing of instruments for measurement and control. A new training school building is also being erected.

SAFETY THAT'S BEYOND PRICE!

Yours for little extra cost with LAUGHLIN Safety Hooks



"The Latch Locks the Load"

Laughlin Safety Hooks, costing little more than ordinary hoist hooks, pay for themselves many times over by preventing accidents. That sturdy safety latch guards against dangerous failure — mechanical or human — in a number of important ways. For example:

1. It prevents load from slipping or jarring loose in mid-air.
2. It eliminates the hazard of carelessness — the load that was *supposed* to be lashed but wasn't.
3. It prevents overcrowding the hook.
4. It warns of hook failure, because latch will open if hook starts to spread.

Rig Safety into YOUR Hoists

by changing over to Laughlin Safety Hooks. Made of drop-forged, heat-treated steel, they have pressed steel latches in the smaller sizes, cast bronze latches in the larger sizes, all with stainless steel springs. Available in various types for 750 lb to 15 ton safe working loads at your mine, mill or oil field supply house.

Free! Catalog-Data Book tells you how to select the *right* wire rope and chain *fitting* for every job. Complete specifications — helpful tables. Use the coupon below.

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THE THOMAS LAUGHLIN COMPANY
87 Fore Street, Portland 6, Maine
Please send Catalog-Data Book #150 to:

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LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

"HERCULES"*
RED-STRAND
the DEPENDABLE
WIRE ROPE
for TOUGH JOBS
* REG. U.S. PAT. OFF.

Experienced wire rope users have found that they can depend on "HERCULES" (Red-Strand) for the strength... toughness... durability – necessary for consistent, safe, and economical service. Our exacting standards and rigid tests insure these results.

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We Invite Your Inquiries

A. LESCHEN & SONS ROPE CO. 5909 KENNERLY AVE. • ST. LOUIS, MO.

ESTABLISHED 1857

New York 6 · Chicago 7 · Birmingham 4 · Houston 3 · Denver 2 · Los Angeles 21 · San Francisco 7 · Portland 9 · Seattle 4

More Yardage with Less Labor

Large Sauerman Slackline Cableway pictured above, dug this pit 800' long and 400' wide in four operating seasons of six months each, handling about 300,000 cu. yd. a season.

Mexico's newest cement mill uses a Sauerman Power Scraper to dig clay from a hill and move this clay to a surge pile feeding into a hopper at the washmill.

How a SAUERMAN machine cuts costs--

MANY jobs of pit and bank excavation, surface mining and stockpiling can be simplified and a great deal of money saved by using either a Sauerman Power Scraper or Slackline Cableway because in this way you combine digging, hauling and disposal of materials in one operation.

First cost of a Sauerman machine is reasonable, maintenance expense is small, and the simplicity of operation permits easy one-man control of even the largest installation. Handling capacities range from 20 to 500 cu. yd. an hour.

Sauerman engineers will gladly study your digging or stockpiling problems. Their advice may save you money and will be given free.

Rope Haulage Equipment Specialists Since 1909

Write for new Scraper and Cableway Catalogs.

SAUERMAN BROS., Inc.

530 S. CLINTON ST. CHICAGO 7, ILLINOIS

Hyster Co., Portland, Ore., has announced the promotion of Richard E. Stiegele to the position of sales manager, Eastern tractor equipment sales division, with headquarters at Peoria, Ill.

Straub Mfg. Co., Inc., Oakland, Calif., announces that a license arrangement has been made with the firm of Sir W. G. Armstrong Whitworth & Co., Ltd., Gateshead-Upon-Tyne, England, for the manufacture and distribution of its equipment in Great Britain, Eire, Europe, South Africa, India, Pakistan, Australia and New Zealand. A similar license arrangement covering the eastern United States, eastern Canada and Puerto Rico has been made with The Pennsylvania Crusher Co., a division of Bath Iron Works Corp., Bath, Me. This permits western Canada to be supplied from California, Maine or England.

Thermoid Co., Trenton, N. J., has announced the appointment of Thomas G. Judd as advertising manager, according to an announcement by Fred Schluter, president of the company. A native of Salt Lake City, Utah, and a graduate of the University of Oregon, where he majored in journalism and advertising, Mr. Judd served as a captain in Air Force Intelligence during World War II. Prior to that he worked as a reporter and correspondent for Salt Lake City newspapers. Since the war he has been editor and publisher of *The Pyramid*, at Mt. Pleasant, Utah.

Thomas G. Judd

Harnischfeger Corp., Milwaukee, Wis., has announced the appointment of Joseph G. Surmacz as chief industrial engineer in charge of production control. Before joining the company, Mr. Surmacz was chief industrial engineer with the Ingersoll steel division of Borg-Warner Co., Chicago, and with the American Steel & Wire Co. in Pittsburgh. David A. Drewery has been named plant industrial engineer and will supervise work methods, time study, job evaluation and cost analysis. He formerly served as plant industrial engineer with Chevrolet Motors and United States Steel Corp.

Sterling Electric Motors, Inc., Los Angeles, Calif., has announced the following additions to the sales and engineering staff: John F. Ingle, district manager, San Francisco, serving central and northern California and western Nevada; Robert P. Killion, district manager, Houston, serving southeastern Texas; H. L. Fritz, Baltimore, to serve the Maryland territory; and Edmond W. Hodge, Jr., Birmingham, to serve the Alabama territory. Joseph P. Foley, Chas. E. O'Leary and Raymond S. Portner have joined the staff of the New York

City district office; and Melvin Maxham and John Malloy have joined the Los Angeles headquarters' sales staff.

General Electric Co., Schenectady, N. Y., announces the appointment of Carl W. Moeller as assistant to the manager of engineering of the fractional horsepower motor divisions, Fort Wayne, Ind. He was formerly divisions accountant for the switchgear divisions at Philadelphia, Penn.

Caterpillar Tractor Co., Peoria, Ill., announces the appointment of M. H. Hulings as assistant district representative in North and South Dakota, and Saskatchewan Province. For the past year he has been with the sales development division as an agricultural special representative.

John A. Roebling's Sons Co., Trenton, N. J., announces the appointment of Walter Whiting as Chicago district manager of the electrical wire division, for the territory covered by Wisconsin, Minnesota, North and South Dakota, Iowa, Nebraska, Kansas, Missouri, Illinois, Indiana and part of Michigan. Mr. Whiting, who joined the company in 1929, has been a salesman in the Oregon territory since 1935.

American Chain & Cable Co., Bridgeport, Conn., has announced the election of Wilmot F. Wheeler as chairman of the board in addition to his duties as chief executive officer. He succeeds Walter B. Lashar who has retired because of ill health. Cyrus N. Johns has been named president and Col. Harry D. Weed, inventor of the Weed tire chain, has been made a director.

Atlas Powder Co., Wilmington, Del., announces that R. K. Gottshall, assistant to the president, has been elected a vice-president of the company. He started as an explosive plant chemist following graduation from Lafayette College in 1927, became director of explosives sales in 1943 and assistant general manager of the explosives department in 1948.

Stewart-Warner Corp., Chicago, Ill., has appointed Ephraim N. Osterberg as director of purchases to succeed Roy F. Stiles, who has retired but will continue to serve in a consultant capacity. Mr. Osterberg, who has been with the company since 1916, was formerly purchasing agent of the Alemite and instrument division and will be succeeded in this position by R. J. Gorzynski, who has been with the company since 1935 and a buyer in the purchasing department since 1944.

Westinghouse Electric Corp., Pittsburgh, Penn., announces that Robert E. Ferry has been appointed manager of apparatus sales offices in Wheeling and Fairmont, W. Va., with headquarters in Wheeling. Mr. Ferry joined the company in 1928, serving in the Pittsburgh office as sales assistant and in the Fairmont office as sales representative. Thomas R. Lawson has been named assistant sales manager of industrial products. He will make his headquarters in Pitts-

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Magic Word for Producing More Low Cost Wire Rope Service

You need not be a magician to make wire rope on your equipment produce more material handling yardage or tonnage. Nor need you be a mathematician to figure out wire rope specifications.

Why? Because, out of long, unending research and exhaustive field proving, Union Wire specialists developed a family of specially designed and constructed wire ropes—each tailor-made for a special purpose and to give you ultimate low cost.

Tuffy is the trade-marked name of this family. To order any of these performance record setting ropes—just say Tuffy to your distributor —which Tuffy, the diameter and length—that's all. See distributor listing in phone book yellow section.

UNION WIRE ROPE CORPORATION

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Specialists in Wire Rope and Braided Wire Fabric

Send Information On Tuffy ☐ Scraper Rope ☐ Dragline ☐ Slings ☐ Chokers ☐ Rotary Line ☐ Mining Machine Rope ☐ Slusher ☐ Towline

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Pulverizers

Have you investigated our new BRADLEY HERCULES MILL? Unquestionably the last word in Economy and Simplicity.

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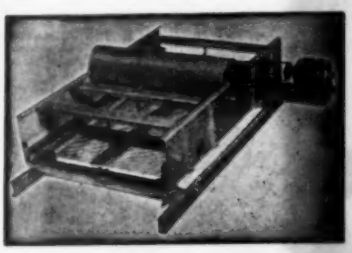
BRADLEY PULVERIZER CO.

ALLENTOWN, PENNA.

FROM GRAVEL TO YOUR FINEST SAND SEPARATIONS—OR STONE TO YOUR FINEST SCREENINGS, UNIVERSAL OFFERS BETTER SCREENING AT A LOWER COST!



Yes, the initial cost of this Screen is low—but of greater importance is its dependability, low operation and maintenance costs. That's where the Universal is a true money-maker!

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UNIVERSAL VIBRATING SCREEN CO.
RACINE — — WISCONSIN

For better service
and more economy
Order from *a thousand and one*
MACWHYTE
Internally Lubricated
WIRE ROPES

It will pay you to get Macwhyte Wire Rope engineered and job-proved for your equipment. Over the years, ropes for all types of quarry equipment have been developed by M… pr… di… You get the correct wire rope for your equipment when you buy Macwhyte.

MACWHYTE COMPANY

2949 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog available on request.

Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles. Distributors throughout U.S.A.

burgh, Penn. Mr. Lawson also joined the company in 1928, working with motor division activities. Prior to his present appointment, he served as assistant manager of the application en…

dent, served as toastmaster and awarded engraved "Golden Hour" electric clocks and charter membership certificates to all veterans, and

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INDUSTRY NEWS

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Rowland "Casey" Jones, Keystone Division, Dravo Corp., Pittsburgh, Penn., at a recent training session on ready-mixed concrete, demonstrated for plant personnel the effect on slump of different quantities of water in the mix

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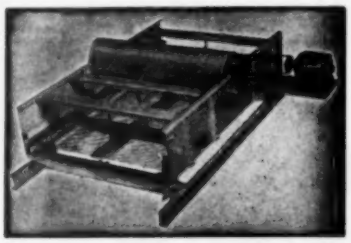

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burgh, Penn. Mr. Lawson also joined the company in 1928, working with motor division activities. Prior to his present appointment, he served as assistant manager of the application engineering department of the motor and control division, Buffalo, N. Y.

The Thew Shovel Co., Lorain, Ohio, has appointed O'Neil Equipment Co., Muskegon Heights, Mich., as distributor in the western half of the lower peninsula bounded on the east and including the counties of Emmet, Charlevoix, Antrim, Kalkaska, Missaukee, Osceola, Mecosta, Montcalm, Ionia, Eaton, Calhoun and Branch. The Dalrymple Equipment Co., Memphis, Tenn., will represent the company in western Tennessee to and including the counties of Henry, Benton, Decatur and Hardin on the east; Mississippi, north of and including the counties of Coahoma, Quitman, Panola, Lafayette, Pontotoc, Lee and Itawamba; in Arkansas, the counties of Cross, Mississippi, Crittendon, St. Francis, Lee and Phillips.

Independent Pneumatic Tool Co., Aurora, Ill., recently initiated 166 employes with a combined service record of 5038 consecutive years into the company's new 25- and 50-Year Clubs. The veterans welcomed into the 50-Year Club were William Lange, tool room machinist, now in his 58th consecutive service year, and Dominick Kellen, inspector, serving his 51st year. Neil C. Hurley, Jr., president, served as toastmaster and awarded engraved "Golden Hour" electric clocks and charter membership certificates to all veterans, and television console sets to each 50-Year veteran.

Towmotor Corp., Cleveland, Ohio, announces that Lester M. Sears, founder and president, has been elected chairman of the board of directors. C. Edgar Smith, executive vice-president, has been named to succeed Mr. Sears as president of the company. Robert L. Fairbank, formerly with Firestone Tire & Rubber Co., has been appointed sales manager. Mr. Sears, who will remain active in the management, founded the company with his father in 1919. He was born in Nebraska in 1888 and graduated from the University of Minnesota in 1912. He joined the Peerless Motor Car Corp. in 1916, and during World War I served with the Emergency Fleet Corp. on special assignments from Secretary of War Newton D. Baker.

C. Edgar Smith

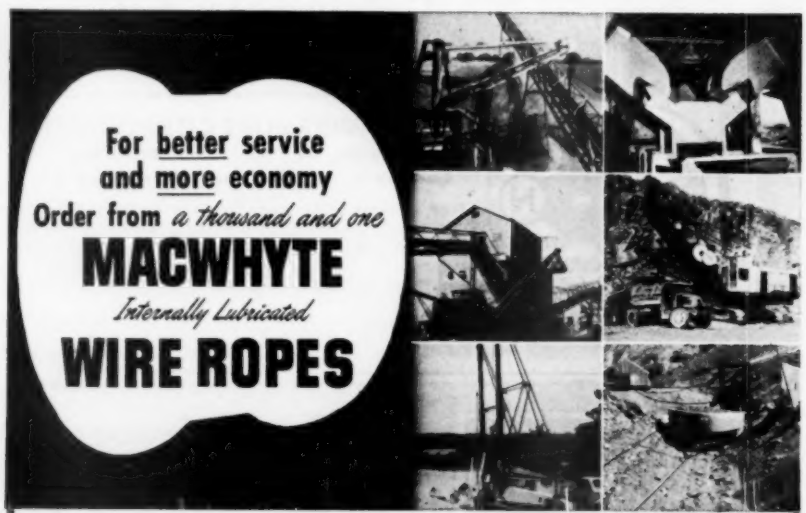
Robert L. Fairbank

Mr. Smith was born in Buffalo, N. Y., in 1904 and received his education at Nichols School, Staunton Military Academy and the University of Michigan. In 1941 he joined Towmotor as sales manager, advancing to vice-president in 1943 and to executive vice-president in 1947. During World War II he was a member of the materials handling industry advisory committee of the War Production Board.

Mr. Fairbank, who was born in Cleveland, Ohio, in 1912, graduated from Dartmouth College in 1933. He was with Firestone for 18 years as salesman, manager of retail stores, and district manager in Cleveland.

General Electric Co., Schenectady, N. Y., has appointed Richard S. Walsh as manager of the induction motor sales division of the small and medium motor divisions. He has been acting manager of the division since January of this year.

Yale & Towne Mfg. Co., Philadelphia, Penn., has announced the sale of its industrial scale business to Detecto Scales, Inc., Brooklyn, N. Y. The transaction involves scale patents, equipment, parts and inventory, but none of the Yale trade marks, except "Kron." The space, machine hours, and manpower released by this sale will be used to relieve the pressure of defense requirements for Yale industrial trucks and hoists.



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INDUSTRY NEWS

Sweden's Ytong Units Now Made in Germany

THE FIRST WEST GERMAN YTONG light "concrete" plant to operate under a general license issued by the International Ytong A/B of Sweden, was recently opened in Watenstedt, Germany, by Professor Ludwig Erhard, West German Minister of Economics, according to a recent newspaper report.

The Ytong plant which is operated by Stone and Earth Co., a subsidiary of the Watenstedt Reichswerke (owned by the federal government) was built under a subsidy granted by the government and is to be paid off over a period of ten years, as stated in the report. A cement plant, also run by Stone and Earth Co., has started operations in Watenstedt.

The Ytong plant has a capacity which corresponds to an annual production of some 44,000,000 normal size brick. The plant plans to utilize the large quantities of fly ash available at the nearby Hallendorf power station of the Reichwerke, as well as slag from the Watenstedt blast furnaces as raw materials along with lime. Comparatively little coal will be needed, as blast furnace waste gas and exhaust steam from the power station are to be utilized. There are plans for the construction of additional Ytong plants in Darmstadt and at Altgarge on the Elbe.

N.C.M.A. Reprints

NATIONAL CONCRETE MASONRY ASSOCIATION is making available to N.C.M.A. members, at cost, reprints of the articles "Water Can Wreck Your House," from *Better Homes and Gardens* and "There's a Gold Mine Under Your House," from *House Beautiful*.

The first one is an analysis of the condensation and moisture problems frequently encountered in residential construction and shows some of the precautions necessary to provide damp-proof dwellings. The latter reprint is expected to be helpful to those members who devote much of their sales efforts in the promotion of concrete masonry basements.

Cover Picture

COVER PICTURE on this issue shows an attractive concrete block window display installed by Smithwick Concrete Products, Portland, Ore., at Meier & Franks, a prominent department store in Portland. The store officials were so enthusiastic and highly pleased over the results that it was decided the display should remain all summer instead of the one week as originally planned. The store's window designers are convinced it will make an excellent backdrop for displaying outdoor wearing apparel and lawn furniture.

Smithwick Concrete Products stated that literally thousands of people have viewed the exhibit and the company has been besieged with telephone calls from interested people as a result of the display. A salesman is maintained at the store to answer questions for approximately 50 visitors per day. The masonry work for the display was performed by Howard G. Jacobs, mason contractor. S. Carl Smithwick is company president.

Rowland "Casey" Jones, Keystone Division, Dravo Corp., Pittsburgh, Penn., at a recent training session on ready-mixed concrete, demonstrated for plant personnel the effect on slump of different quantities of water in the mix

FOUNTAIN SAND & GRAVEL CO., Pueblo, Colo., has begun construction of a $100,000 central concrete mixing plant. The company's heavy equipment storage room, some of the mixer trucks and other equipment were recently destroyed by fire. The fire was believed to have been started by faulty wiring.

BRIGHTON CONCRETE PRODUCTS CO., West Belmar, N. J., has been sold to Joseph L. Bonney, Jr. A variety of sizes of cinder and concrete block are manufactured at the plant and over 1,000,000 block were produced by the company in 1950.

CALUMET FLEXICORE CORP.'S concrete slab plant at Gary, Ind., was recently damaged by fire, caused by an explosion of a booster oil heater in a dry kiln. The heat damaged production lines, steel forms and rubber tube cores. Total damage was estimated at $70,000.

HOLLY MANUFACTURING CO., Flint, Mich., has added a ready-mixed concrete plant to its sand and gravel operations. Officers of the company are Roy A. Horning, president; James F. Smith, vice-president; and George L. Whyel, secretary-treasurer.

THE CONCRETE PRODUCTS ASSOCIATION of Washington held its 22nd annual summer meeting, June 8-10, at the Harrison Hot Springs Hotel, Vancouver, B. C. The attendance was approximately 50 percent greater than ever before, with representatives of the National Concrete Masonry Association and the Western Concrete Pipe Association in attendance. The meeting included a visit to plants of the British Columbia Concrete Co., Ltd., and Marpole Brick Co., Ltd.

PHILLIPS CONCRETE CO., Kansas City, Mo., has opened a branch unit at Lebanon, Mo. The new plant will produce ready-mixed concrete. Walter Merith is manager of the Lebanon branch.

READY MIXED CONCRETE CO., Sidney, Neb., a new concern under the ownership and management of Paul Hakes, has started the production of ready-mixed concrete.

THE THIRD ANNUAL MICHIGAN CONCRETE conference was held recently at Wayne University, Detroit, Mich. The theme of the meeting was "Uses of Precast Concrete." Discussion topics included concrete masonry design and construction; precast floor systems; precast structural elements; and applications of prestressed concrete to precast members. The conference was sponsored by Wayne University's Department of Civil Engineering and the Portland Cement Association.

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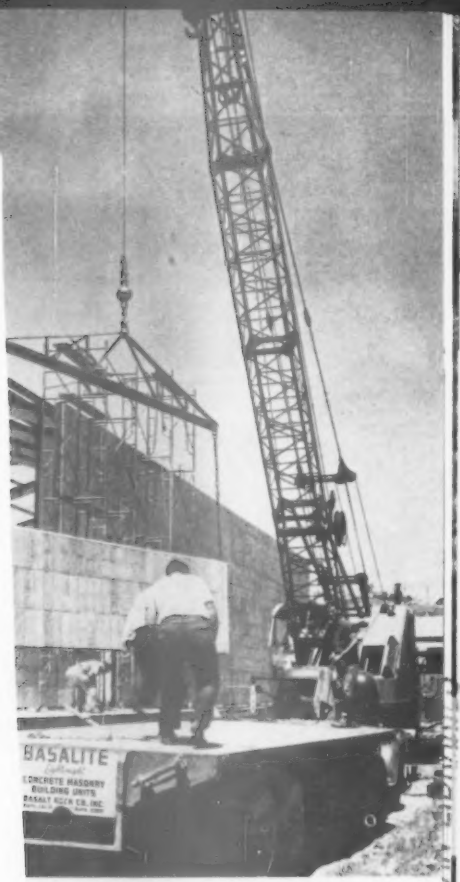

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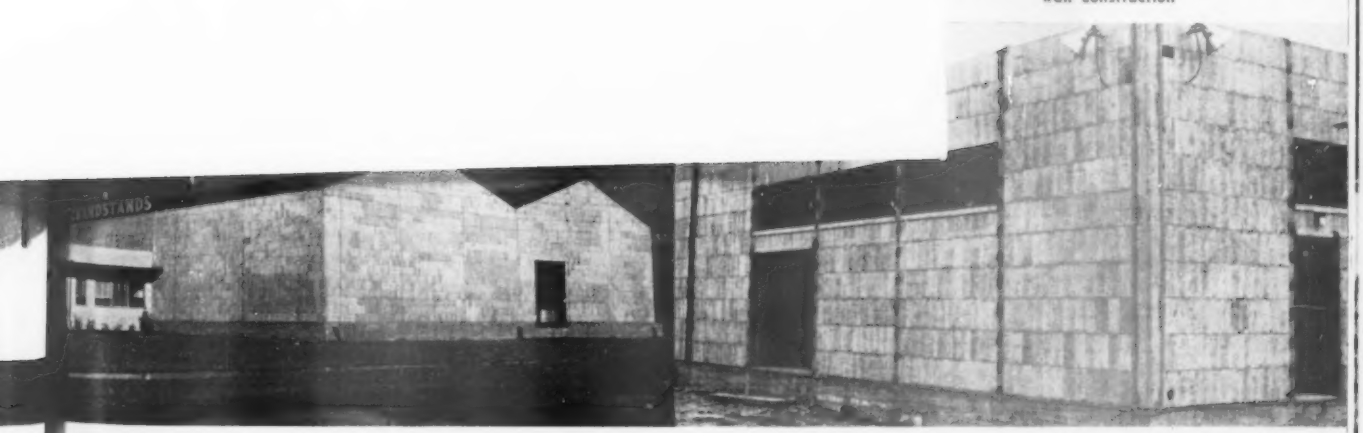

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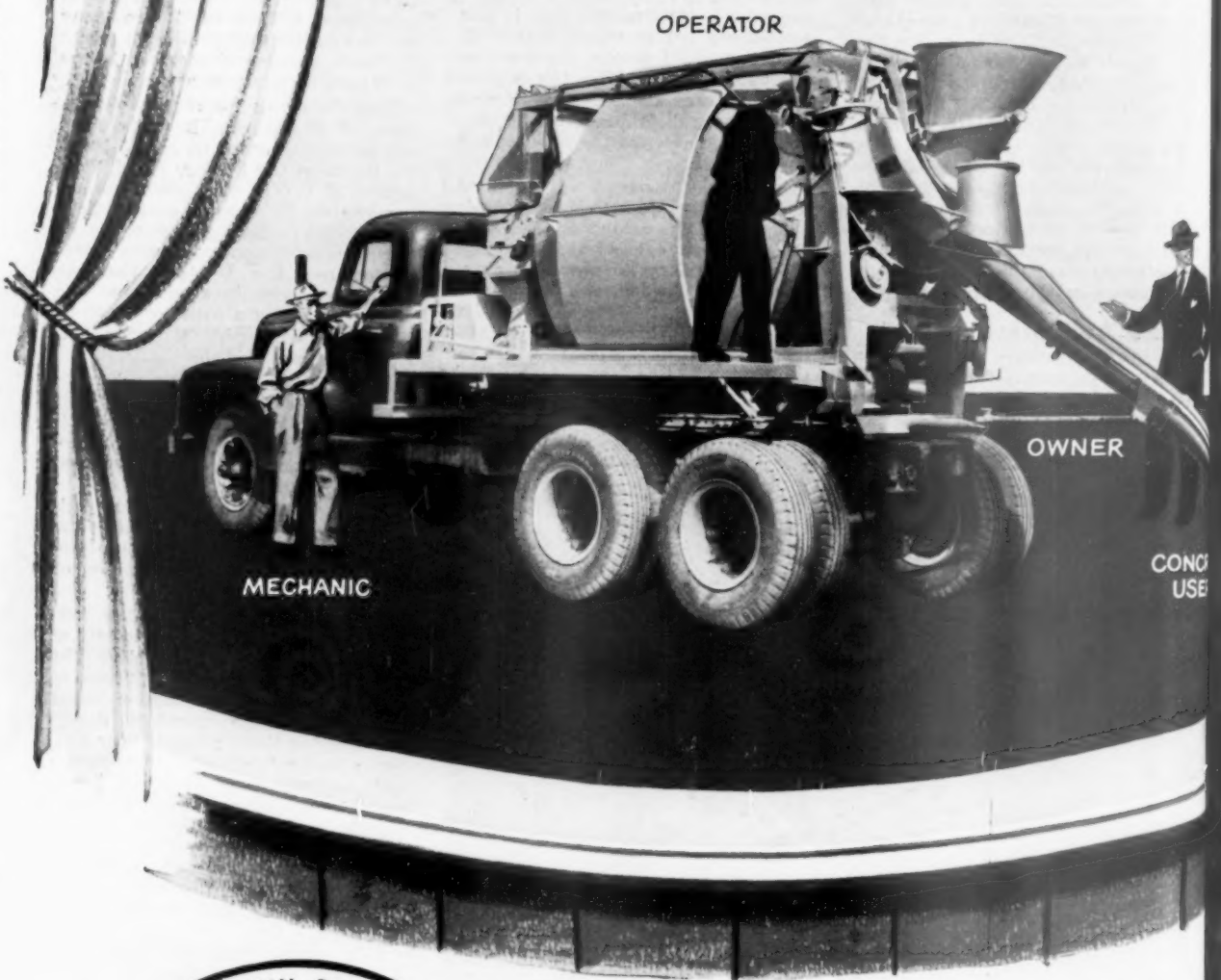

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NEW APPLICATIONS OF PRESTRESSED ASSEMBLY OF MASONRY UNITS

Basalt Rock Co. finds that its Strestcrete development has widened sales outlets into many fields

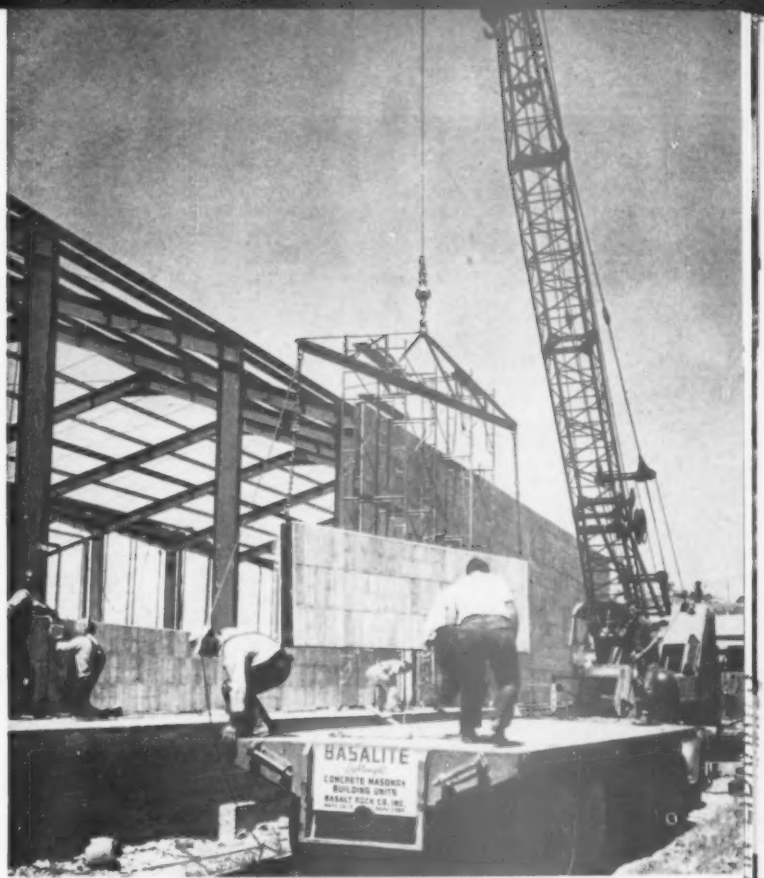


Fig. 1: Positioning panels of Strestcrete tongue and groove siding on a steel frame building

THE FLEXIBILITY OF THE Strestcrete system of construction as developed by the Basalt Rock Co., Napa, Calif., has afforded its creators with an ever increasing number of new products.

One of the first products to be announced after the introduction of the roof and floor slab was Strestcrete tongue and groove siding. This was originally intended to be used as a non-load bearing curtain wall for the exterior and partitions of steel frame buildings. Like the floor and roof slab it is assembled from precast concrete units manufactured on an automatic block machine. The contacting edges are precision ground. Reinforcement consists of ⅜- or ½-in. round steel threaded rods which pass through holes provided in the elements.

Panels are assembled by pre-tensioning the reinforcing rods against the concrete units and steel plates positioned at the end of each assembly. Mastic is used to seal the tongue and groove joints between panels and waterproofing paint seals the ground joint. Attachment to steel frame buildings is accomplished by welding or bolting the end plates to the steel columns.

The size of tongue and groove siding panels which can be assembled is limited only by the available facilities for transporting and hoisting the panels at the jobsite.

Examples of two of the recent installations of this material on steel frame buildings are illustrated in Figs. 2 and 5.

Tongue and Groove Siding

One of the newest innovations in the use of tongue and groove siding is its application to heavy mill timber frame buildings. Jobs to date of this type have used 8- x 8-in. and 8- x 10-in. columns and 8- x 16-in. beams with the siding bolted directly to the timbers. This method is particularly important at the present time with the ever increasing steel shortage that exists. Currently three structures are under manufacture which will utilize

Fig. 2: Completed warehouse, shown under construction in picture above, made of Strestcrete panels

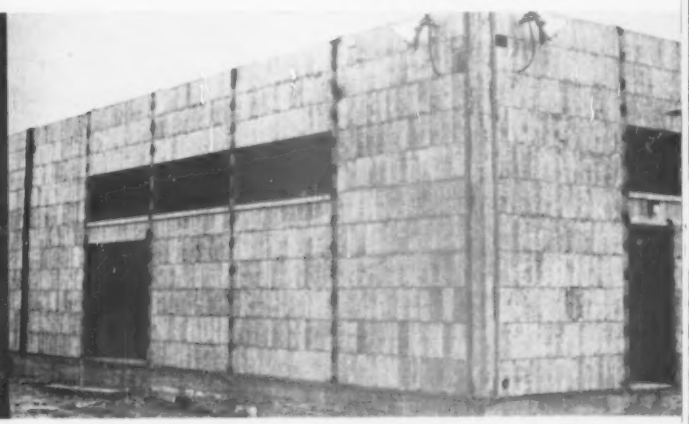
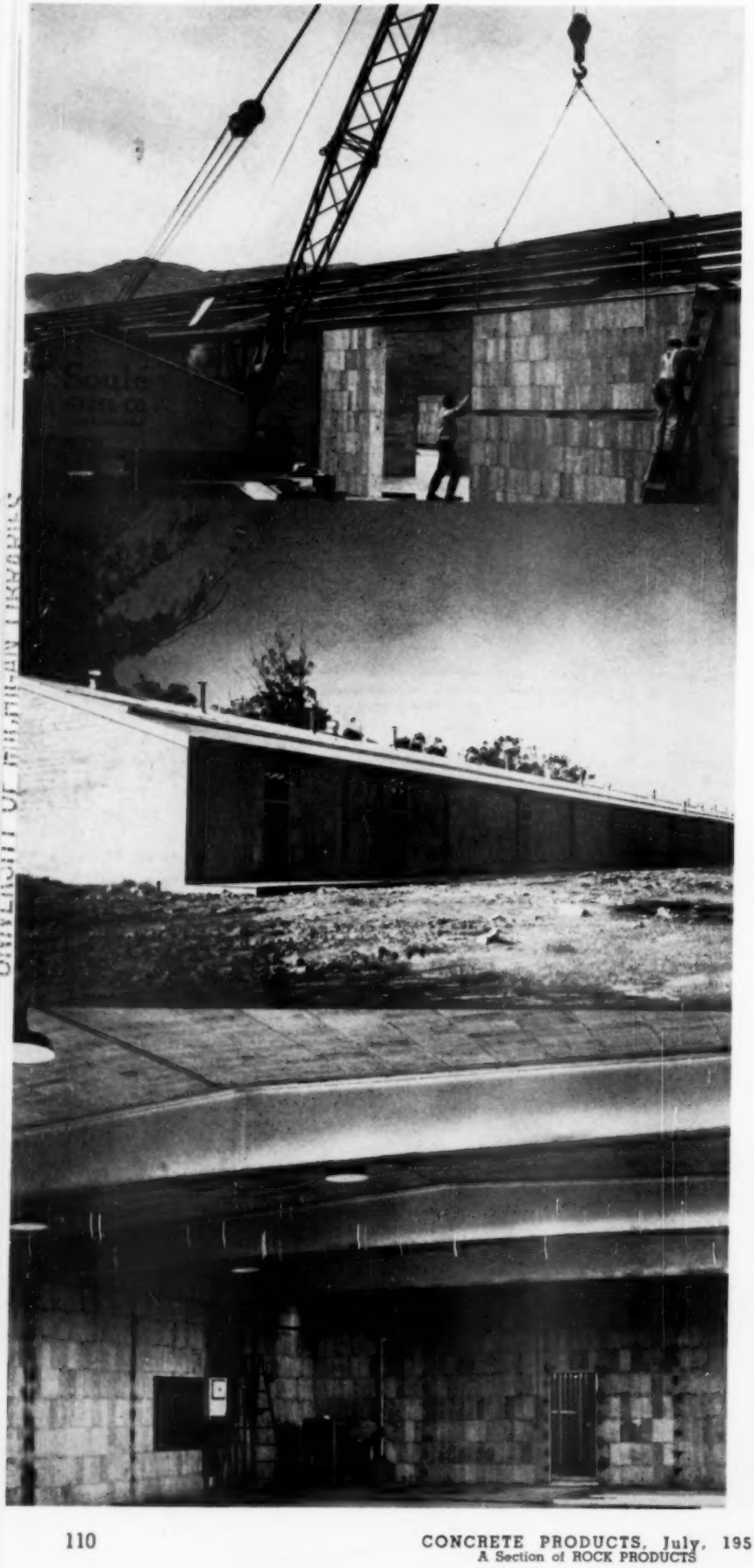


Fig. 3: Exterior corner of a Strestcrete integral steel frame building with parapet wall construction



heavy timber columns, bow string trusses and continuous steel sash above the siding.

Illustrative of the heavy timber frame building with Strestcrete tongue and groove siding is the structure pictured in Figs. 7 and 8.

Tongue and groove siding has also been utilized on Butler-type rigid frame metal buildings with standard size panels being bolted to the steel columns. Structures of this type must confine the use of Strestcrete to wall sections as the steel frame is not strong enough to support a concrete roof. Figs. 4 and 5 picture this type of installation on a high school manual training shop building. This structure is 361 ft. long and 50 ft. 4 in. wide. The entire Strestcrete installation was completed in 12 hr. with a crew of five men and one crane.

Integral Frame Buildings

Extensive use of tongue and groove siding, coupled with a desire to use the material for load-bearing walls, led to the development of Strestcrete integral steel frame buildings. Substituting a light steel channel for the flat end plates and welding the channels of adjoining panels, a load-bearing steel box type column is formed within the Strestcrete wall. By providing a specially designed fusion welded steel plate girder which attaches to the columns and supports a Strestcrete roof, the Basalt Rock Co. is selling standardized package buildings with walls as high as 22 ft. 8 in. and clear spans up to 56 ft. See Figs. 1, 3 and 6.

The building is designed to set on column footings independent of floor slab or retaining wall. The foundation consists of concrete piles formed by digging over-sized post holes spread at the bottom and pouring them with concrete reinforced with steel rods welded to a base plate. Wall panels are erected on the base plates and attached by welding.

Two Strestcrete integral steel frame buildings have been developed: (1) the commercial-type, characterized by parapet walls (Fig. 3) and, (2) the industrial-type with over-hanging eaves. Wall panels are either 6 or 8 in. in thickness and the wall heights vary in multiples of 16 in. between 10 ft. 8 in. and 22 ft. 8 in. Clear spans of 32, 40, 50 and 56 ft. are available.

The manufacturer furnishes the services of a field engineer to supervise the erection of the structures.

Fig. 4, top: Standardized panels of Strestcrete tongue and groove siding being positioned on a prefabricated rigid frame structure. In this installation the panels are bolted to the frame members

Fig. 5, center: The completed structure, shown under construction above, is a high school manual training building

Fig. 6, bottom: Interior view of building showing welded column connections, fusion welded steel plate girders and Strestcrete roof

The material provided includes foundation plates, wall sections, steel columns, girders, roof section, fixed and vented sash, and paint for the exterior. The manufacturer does not provide other material or labor for construction, this being a function of the general contractor. Welders, riggers and steel erectors are the crafts which actually perform the work.

The Strestcrete integral steel frame building is designed in accordance with the Pacific Coast Uniform Building Code. The steel frame is designed for 17 lb. per sq. ft. live load and 42 lb. per sq. ft. dead load on horizontal projections and 15 lb. per sq. ft. wind load on vertical projections. The roof is 1/12 pitch.

The price of the material for integral steel frame buildings in Basalt Rock Co.'s marketing area ranges between $1.80 and $2.80 per sq. ft. of floor area depending on the following variables: (1) height and thickness of walls, (2) length and span of building and (3) transportation costs.

Advantages of System

From a concrete products manufacturer's viewpoint, one of the most desirable features of this packaged building is the ability to quote a price on the basis of square foot of floor area.

The speed with which Strestcrete structures can be erected brings about the following advantages: (1) slabs are placed without shoring and erected panels are immediately available to serve as working platforms for the following craftsmen, (2) less equipment and fewer men are required on the job, thus permitting the contractor to undertake a larger volume of business, (3) the ability to use pier-type foundations creates a substantial saving in cost of the preparatory work, (4) when erected, all the advantages of a permanent structure are retained and yet additions can be readily added without loss of material, and (5) the entire structure is composed of completely fire-safe materials. This has resulted in substantial savings, in fire insurance premiums over other forms of construction comparable in cost with the Strestcrete integral steel frame buildings.

The standard building is being adapted for many types of occupancy including warehouses, factory buildings, garages, office buildings, retail stores and schools.

Fig. 7, top: Placing 5-ft. 4-in. x 25-ft. panels of 6-in. Strestcrete tongue and groove siding on a mill timber frame building

Fig. 8, center: Building shown above nearing completion

Fig. 9, bottom: Roof view of building immediately after placing of Strestcrete roof slabs. Open joist section between slabs has not yet been grouted; large openings are for skylights

The central-mixing plant is the middle structure, just left of center. Bulk cement storage silos are at far left and at right is the "cluster" of four bins used to handle dry-batched aggregates

Batching plant control board: operator is setting weight on one of aggregate balances. It cuts off automatically. Cement scale is background

CHICAGO'S READY MIX INDUSTRY CONTINUES RAPID GROWTH

Material Service Corp. has ultra-modern central mixing plant and now has more than one hundred trucks serving city and suburbs

By L. DAVID MINSK

MATERIAL SERVICE CORP. entered the ready-mixed concrete field in Chicago in the Fall of 1949. True to the nature of the company, ready mix operations were undertaken on a large scale. Even before the first batching plant had been fully converted for loading truck mixers, this new ready mix producer was delivering a 650-cu. yd. order in one day. About 100 trucks were in service before the end of the first year and more are now on order.

The supplying of concrete to jobs in the Chicago area has been principally by batch delivery, which Material Service has so highly developed both as to cost and delivery that ready mix has been slow to catch on and apparently will not completely supplant dry batch except on smaller jobs.

Material Service has for many years been the largest supplier of aggregates in the Chicago area. Though a small ready-mixed concrete operation had been conducted at the company's Lockport quarry for three years, last year marked the first major production of ready-mixed concrete. When experience in the outlying areas proved the acceptance of ready-mixed concrete, Material Service entered the field rapidly, first placing 50 trucks in service in a short period. The speed with which this was done and with which ready-mixed concrete was made generally available over an entire area the size of Chicagoland is perhaps unparalleled in the industry.

The company's operations blanket the city of Chicago; seven of its materials yards now have concrete facilities. Each yard delivers within a four mile radius. The boundaries are flexible, however, so if the number of trucks from one yard is insufficient to handle a day's business in the adjacent territory, the batching facilities and trucks from the other yards can be used. Truck capacities range from 4½ to 6½ cu. yd. as truck mixers, all on tandem axles.

Order Dispatching

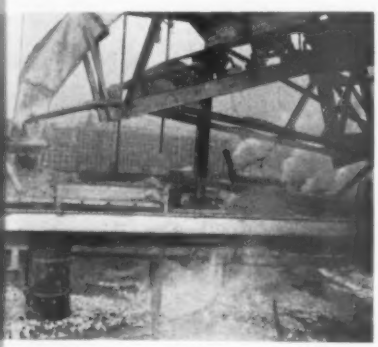
Material Service had utilized a central order office for dispatching building materials orders before the installation of concrete facilities. This consisted of an "order board" in the company's main office in downtown Chicago, at 33 N. LaSalle St. This was connected by teletype to each yard. It was only necessary to increase the number of circuits and add a teletype machine at each ready-mixed concrete shipping office. TelAutographs are used to relay the orders and instructions for each load from the yard shipping clerk to the central mixing plant. These, in conjunction with records to be described later, provide permanent records available in case of supposed error. At the transit mix batching plants, continuous weigh records (an order copy left at each batching stop) are used.

New Mixing Plant

The newest unit in Material Service's concrete facilities is a large central mixing plant, near downtown Chicago on the North Branch of the Chicago River, just two miles from Chicago's Loop. The yard, which is located at 901 N. Sangamon St., is designated Yard No. 1, and is also used for dry-batching of aggregates, sand, cement, and straight loads of aggregates. Design of the mixing plant presented many difficulties, for the yard area is rather tightly compressed between the river on one side, switching tracks of the Chicago and North Western Railway on another, and a city street on the third side. The tracks and river converge at one end of the plant area, further restricting available space.

"In laying out the plant, we were fighting for inches, not feet," John F. Meissner of John F. Meissner Engineers, Inc., remarked. His firm de-

Operator is controlling addition of air-entraining agent. Handles at top of picture are pulled to open water valves, then are turned off successively as scale weight approaches zero



The distributing belt over the four dry batching bins can be rotated through 90 deg. and run forwards or backwards to reach all bins

signed the plant. The cut up area into which the plant had to be put necessitated some compromise and some departures from standard practice. It was early decided to keep the entire yard on the same grade, allowing for drainage, in other words not to sink the roadway under the central mix plant. This was done to reduce sloppy conditions which were felt would result if there were a depressed roadway. This decision helps to explain the unusual layout of the belt conveyors and bins. (See plan drawing, Fig. 2). Briefly, a tunnel conveyor reclaims from stockpiles along the river and feeds to an inclined belt. This inclined belt is used to fill both dry batching bins and bins of the central mixing plant.

Mixer

The central mixing plant was designed around a single 6-cu. yd. Smith tilting mixer. This was chosen in preference to two smaller mixers for two reasons: the company is already using large trucks and plans to use even more 5½-6½ cu. yd. mixers, and secondly, more head room would have been required for chuting to two smaller mixers than to the single 6-cu. yd. unit.

Height in the mixing plant was the least available dimension. The large agitators used required the central mixer to be placed high above the roadway. The bins could not be extended very high, for this would make the inclination of the conveyor from the tunnel reclaiming belt too great. The slope was fixed at 18 deg., then the bins were fitted under the head end, so to speak. These have a total capacity of 400 tons in five compartments, two of 100 tons each, and three of 67 tons each. Three cement bins are adjacent to the aggregate bins. Each has a capacity of 200 bbl. All bins are Butler units.

Automatic Weigh Batching

Two men are stationed in the central mix plant: the operator and his helper. The operator manipulates the controls while the helper takes moisture measurements and checks equipment; he can also take over the batching if necessary. Scientific Concrete Service Corp. [SC]² batch weighing units are used. These reputedly are the first in use with completely automatic cutoff. In fact, the whole operation is nearly all automatic.

The Toledo scales are inverse weighing, that is, as the load is batched the pointer approaches zero. Two scales are used, one for all aggregates and water, and one for cement. By means of pneumatically-controlled clutches, any one or more of the cement bins may be tapped at once. Usually when fast batching is necessary, two bins of cement are tapped simultaneously. One of the bins can be used for fly ash in bulk.

Batching Operation

This is the sequence of operations. The operator sets the beam weight on the cement scale and pushes a button on the main control board. This starts the cement batching drive. Then he sets the beam weight on the aggregate scale to batch the sand and pushes its control button. The bin gates open pneumatically and fill rapidly until about 50 lb. more are to be added, when a solenoid switch closes the bin gates partially. Batching continues at the reduced rate until the zero point is reached, then a second solenoid actuates the gate control, closing it completely. Next, the gravel is added in the same manner, its weight being set on a second beam. A third beam is used to weigh the correct amount of water, again using two solenoids to turn off first one, then the second, 4-in. pipe line valve. Meanwhile the cement has shut off automatically. A syntron electric vibrator controlled from the switchboard dislodges sticking cement.

Three handles on the switchboard control emptying the weigh hoppers into the mixer. First the water control is thrown, then the aggregate and finally the cement. When the last control (cement) is thrown, a timer is automatically started. It indicates by means of a light box; when the light goes off the mix is ready for discharge.

The mixer is tilted by an air ram controlled by the batching operator. Through a sloping glass window he can look straight down and see the mix pouring into the small feeder hopper and into the truck below (metal grill forms the floor surrounding the front part of the mixer). A subhopper or funnel can be lowered to span the distance between the truck hatch and the concrete discharge chute. This hopper is raised and lowered by means of a small electric winch on the mixer floor, and is controlled by a man on the ground or by the truck driver.

Mixing Records

Records kept in the mixing plant further prevent errors. As an order is received on the TelAutograph by the mixer operator, it is checked off and the batch started. An Esterline-Angus continuous graph records all weights of the batched cement. A second graph records weights of the aggregates and water. The graph movements start as soon as a beam weight is moved off a

Fig. 1: Map of Chicago area showing the eight yards at which ready-mixed concrete plants are located

switch. After all materials have been weighed the operator pushes a button, which actuates a numbering device that stamps onto the graph a control number coinciding with the number of the delivery ticket.

Moisture content of the sand and aggregate is taken every half hour, using the [SC]² system. When the use of live steam in winter causes a high moisture content, the moisture is checked at shorter intervals.

Conveyors

The tunnel conveyor running alongside the river reclaims sand and gravel barged in from Material Service's river plants. A rail-mounted crane is used to cast the barge load into stockpiles. Though only the first 240-ft. section of the tunnel conveyor is installed, equipment is on hand to lengthen this to 390 ft. This may be increased even more if it is found necessary later. The belt is 30 in. wide and travels at 220 f.p.m. A 15-hp. motor was originally installed, large enough to take care of any foreseeable conveyor expansion.

The tunnel conveyor discharges to the inclined conveyor, which is on 240-ft. centers and has a lift of 68½ ft. The head end of this conveyor is over the dry batching bins, which are four 200-ton bins installed as a "cluster." A flop gate either shunts material to a distributing belt below, or else to an 89-ft. conveyor feeding the central mixing plant. The distributing belt, on 22-ft. centers, is reversible and can be rotated through 90 deg. Placed across the bins on the diagonal, the belt can feed two bins from one position by running forward or backward. To reach the other two bins the entire truss is moved through a 90-deg. arc, then belt movement in either direction will feed these bins. All belts are 24 in. wide, with the exception of the tunnel conveyor belt which is 30 in. The system has a design load of 350 t.p.h., though generally it carries about 400 t.p.h.

Two concrete silos for storing cement are alongside the mixing plant. Each has a capacity of 2000 bbl. and each is divided into two equal compartments. Bulk cement is delivered by rail to a siding, though a port for truck delivery is available. A cement

Small hopper is lowered to span distance between truck mixer and discharge chute

Operator's view from control board station, looking past mixer into discharge chute

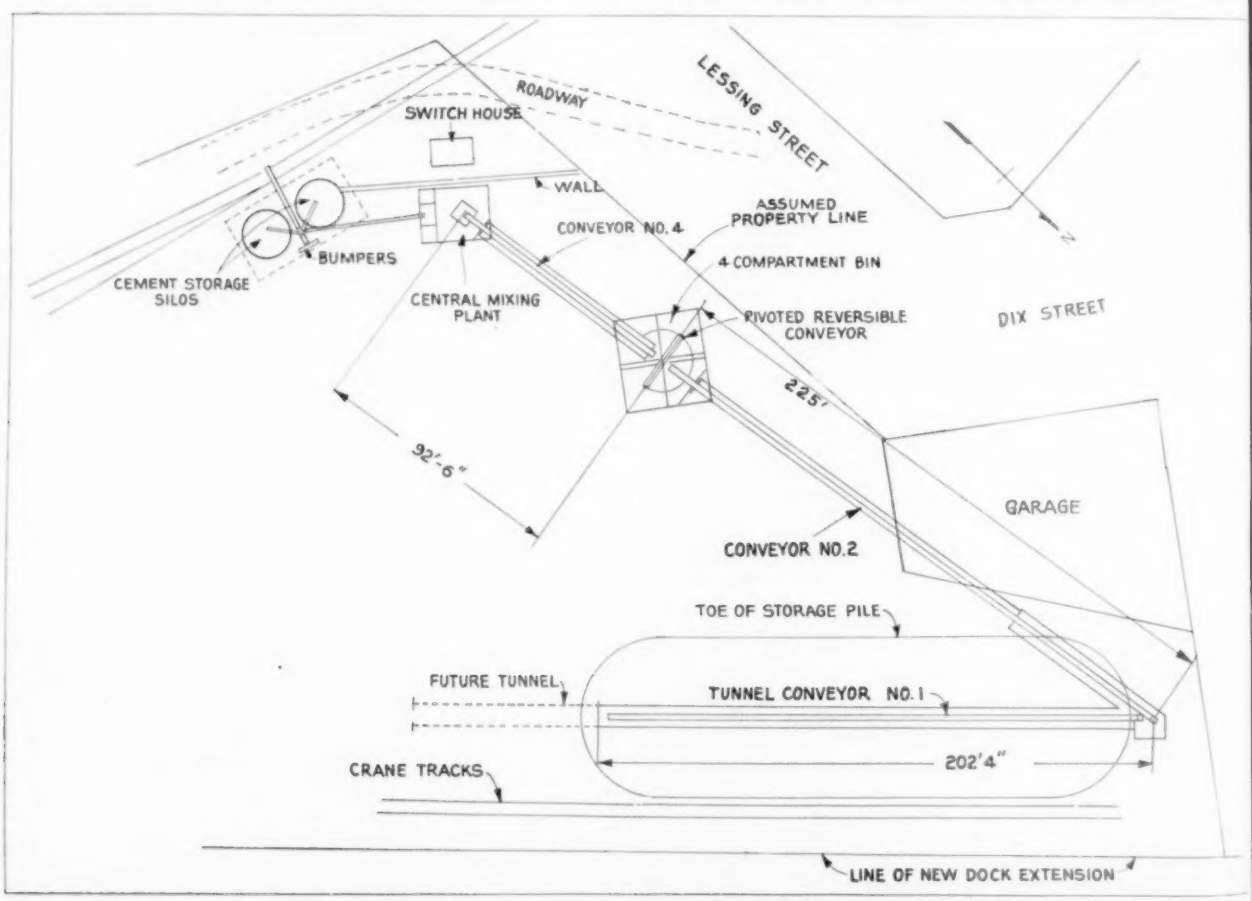
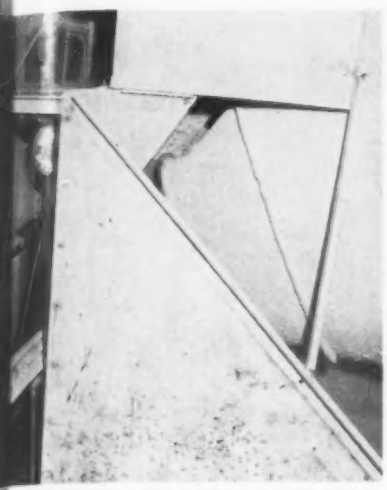


Fig. 2: The yard area is very limited, as can be seen in this drawing



Mixer (right) is discharging into chute. Winch used for raising and lowering subhopper is at left

Charging end of the 6-cu. ft. mixer. Flop gate on chutes, left, direct materials into mixer or to dry batching chute

screw and elevator load the silos. Gravity feed through rotary valves is used to reclaim cement. Air jets are installed in the lower part of the silos to aerate the cement. Standard portland cement is commonly used, but modified high-early can be carried in any of the cement compartments. The plant is equipped with automatic dispensers for Darex and Pozzolith.

Conveyor sections were made by Barber-Greene, though most of the pulleys, the distributing belt and the tunnel conveyor are special units fabricated by A. F. Anderson Iron Works, Chicago, Ill. This company also made all the steel superstructures over both the dry batch bins and over the central mixing plant. The cement silos were built by Material Service Corp. itself. All conveyors are powered by Allis-Chalmers motors through Falk speed reducers. Truck mixers are Rex, Jaeger and Smith. The mixing plant is built on what is best described as a reinforced concrete "table" having four legs and a top. The mixer, bins and superstructure are on top of this.

Officers

Material Service Corp. is one of the largest aggregate producing companies in the country. Its growth has been rapid, from a small company 30 years ago to one doing over $30,000,000 in building materials business last year. Col. Henry Crown is chairman of the board and Irving Crown is executive vice-president. Other officers are George W. Lenzie, vice-president and operating superintendent and S. J. Marks, vice-president and sales manager. Harry F. Thomson, for 20 years an active producer in St. Louis, was retained as technical adviser of the ready-mixed concrete division.

Plant Locations

The Blue Island, Lyons and Thornton plants are in suburbs; the latter two are at the company's quarries. The Peterson Ave. plant on the north side serves the suburban areas as far north as Skokie and Wilmette. Reference to the map (Fig. 1) shows how the plants are located to cover all the city and most of the near suburbs.

Two more plants similar to the Yard No. 1 central mixing plant are under construction at Material Service yards at 33rd and California Ave. southwest of the loop and at 93rd and Ewing Ave. on the far south side. Design details are comparable, but the conveyor layout in each case will conform to the available space.

It is Material Service's plan to cover the entire area of Cook county, Ill., and northern part of Lake county, Ind., with plants located so at no time will their haul be more than four miles to any point in the area.

Building Research Congress

THE 1951 BUILDING RESEARCH CONGRESS to be held in London, England, September 11-20, during the last month of the Festival of Britain, will have an international attendance and hear papers from authorities of many countries.

Included in the technical session programs are talks by R. Fitzmaurice, Great Britain; Dr. J. P. Mazure, Holland, and C. O. Christenson, U.S.A., on "The Influence of Mechanization and Prefabrication on Techniques and Cost of Building." Mr. Fitzmaurice will give a general review of the subject; Dr. Mazure will present the European approach to new methods of construction; and Mr. Christenson will present typical small dwelling construction in the United States.

Other program topics include, general trends in research on building materials, by Dr. T. W. Parker, Great Britain; research on weathering and durability, by R. J. Schaffer, Great Britain, and Dr. Lobry de Bruyn, Holland; a discussion by A. Marini, France, on the influence of present practice in structural design on economy in building and its relation with new techniques for manufacture and erection of components for building. Other discussions will be presented by E. V. Gibbons and M. F. Goudge, on the effect of low temperature on the durability of building materials in Canada; modern developments in reinforced concrete design and the influence of research, by Prof. H. Granholm, Sweden; a review of research on reinforced concrete, by Dr. F. G. Thomas, Great Britain; research and the development of prestressed concrete, by Dr. A. A. Collins, Great Britain; problems associated with the design and use of thin concrete shells, by Prof. A. L. L. Baker, Great Britain; the effect of weather conditions on heat transfer through building elements, by Dr. A. J. A. Roux, South Africa; the effect of moisture on the thermal conductivity of building materials, by D. van Zuilen and E. van Gunst, Holland; concrete quality control, by R. F. Blanks, U.S.A.; concrete quality control, with particular reference to the economic aspects, by C. L. a'Court and R. Ward, Great Britain; concrete quality control in building construction, by R. L'Hermite, France; building construction in hot climates: some climatic considerations, by J. W. Drysdale, Australia; heat insulation in temperate climates, by Dr. P. Becher, Denmark; a review of lightweight concrete, by T. Whitaker, Great Britain; accelerated curing methods and high early strength concrete developments in research, by R. W. Nurse, Great Britain; the durability of concrete in structures, by H. F. Gonnerman, U.S.A.; the use of stone for building in France, by A. Marini and Mr. Damarre, France; the technology and economics of stone housing in Great Britain, by H. L. Broughton, Great Britain; and developments in research on the burning and hydration of lime and on its use in building, by N. Stutterheim, T. L. Webb and B. Uranovsky, South Africa.

Many excursions and weekend sightseeing trips have been planned for the benefit of the overseas visitors.

Rubber Gaskets for Concrete Pipe

UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, has issued a brochure containing engineering specifications for use of Hexseal rubber gaskets with reinforced concrete sewer pipe. Among the subjects covered by the text and drawings are type of pipe; dimensions, pipe design; steel reinforcement, concrete; water curing; steam curing; curing compounds, and curves. A special section discusses installation of the gasket.

Universal Concrete Pipe Co. is sole sales agent for Hexseal gaskets, which were specially developed for the company. Copies of the brochure may be obtained by writing to Universal Concrete Pipe Co., 297 S. High St., Columbus, Ohio.

Campbell Supply Co., Marquette, Mich., utilizes dealers and advertising, has large capacity mechanized plant

Campbell Supply Co.'s plant is located close to the ore loading dock at Marquette, Mich.

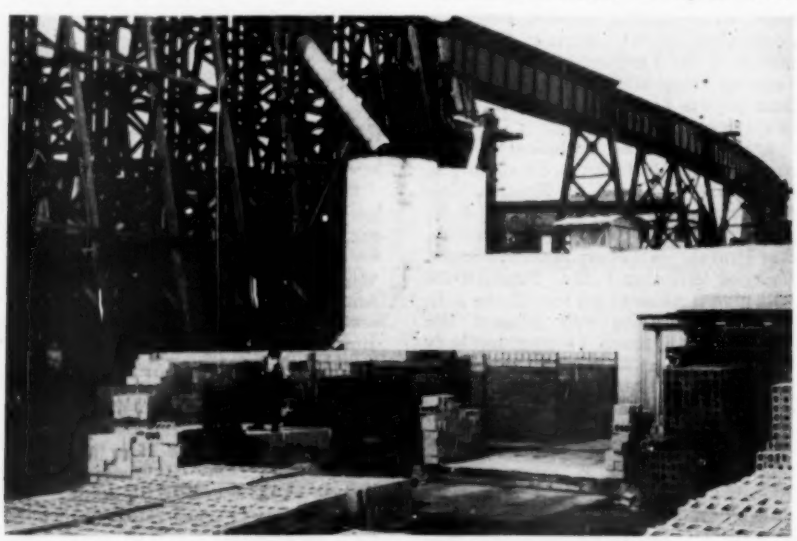
SELLING BLOCK THROUGHOUT WIDE AREA

CAMPBELL SUPPLY CO. operates a block plant in one of the north outposts of the United States: Marquette, Mich., an iron-ore loading port on Lake Superior. Since construction is perforce seasonal in this area due to the extremely cold winters, operation of this block plant is carried on during summer months only. The crew that runs the block plant in the summer spends the winter operating a retail coal yard, also owned by Campbell Supply Co.

A new steel quonset-type building measuring 40 x 100 ft. houses a Besser Super Vibrapac. This company, since its founding in 1930, had progressed from a manually operated face-down machine to a Miles tamper in 1938. The present plant was completed in 1947 and the large automatic machine now in use was installed at that time.

Because this plant is built immediately on the lake front at the base of an ore dock of the Duluth, South Shore & Atlantic Railroad, sand, crushed stone and processed cinders are dumped into the top of 35-ft. high storage bins from the loading dock railroad, which is possibly 50 ft. above grade at this point. Two Neff & Fry concrete stave silos, 35 ft. high and 12 ft. in diameter, hold 60 tons each of usable capacity. Management of this plant feels that it is more satisfactory to fill the bottom of the silo with aggregate to gain the necessary elevation for gravity flow than it is to install false bottoms in the silos.

A recent addition to this aggregate storage system is a 5-cu. yd. truck hopper from which material is fed to a bucket elevator for elevation to the tops of the silos, thus allowing for truck deliveries as well as rail deliveries of material. A Jeffrey-Traylor electromagnetic vibrating feeder delivers material from the hopper to the bucket elevator, the top of which discharges to a pants-leg arrangement for diverting flow to either silo.



Material shipped in by rail is carried to silos by chute in center, coming down from the ore loading dock

Bagged, air-entraining cement is used at this plant and is unloaded from flat cars by means of wooden pallets and fork-lift trucks. The loaded pallets are stored in one end of the main building and transferred, one at a time, to the mixer floor as required. Two Erickson fork-lift trucks are in constant use at the plant not only for transferring cement but also for movement of filled block racks and cubed block.

Material is fed by gravity from the silos to a volumetric proportioning box directly above a 50-cu. ft. Besser mixer. This mixer dumps concrete to a 50-cu. ft. skip hoist for elevation to the machine hopper.

Block are removed from the machine via a pneumatic offbearer to 72-block racks. Loaded racks are transferred to curing rooms of cinder block construction by fork-lift truck. These curing rooms are constructed at mid-point and to one side of the quonset building. Curing cycle at this plant includes four hours of set time. A longer period is required for the initial set due to the prevailing cold temperatures in this area. After the setting period, steam is admitted to the rooms until such time as the temperature has been raised to 160 deg. F.; this usually requires about three hours. Block are then allowed to soak overnight. Steam is supplied from a Kewanee 60-hp. coal stoker-fired horizontal boiler.

Upon removal from the curing rooms, block are cubed on a concrete apron before being removed to yard storage. Management of this operation employs a simple and inexpensive method for building cubes of half-block and other odd sizes that utilizes a sheet of building paper. A sheet with a square dimension as large as the base of the cube is placed between each third tier. This paper has suf-

MACK TRUCKS

Get Things Done!

● Extra effort — that's the order of the day as American industry swings into high gear to meet the growing demands of the nation's expanding defense program.

Nowhere is this more important than on vital construction work and on the job of keeping raw materials flowing from the mines, the forests and the oil fields.

Here's work that's cut out for Mack trucks... jobs where big Macks show at their best in *extra* strength and stamina, *extra* performance and *extra* dependability.

Your nearest Mack branch or distributor will show you how Mack's exclusive design and construction can boost output on your particular job... *get things done* faster and at lower cost. You'll find it's a story well worth hearing.

Mack TRUCKS

... outlast them all

Mack Trucks, Empire State Bldg., New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

Mack trucks have a reputation for getting things done in rugged, ready-mix service. This Model LJSW six-wheel diesel Mack is operated by San-Vel Contracting Co. of Littleton, Mass.

Officers of the company are, left to right, L. B. Frazier, president; Carl C. Clark, vice-president and plant manager, and Ted Greenleaf, assistant plant manager

ficient tensile strength to keep the cube from separating.

A contract recently filled by the company called for 30,000 floor filler block measuring 8 x 8 x 20 in. for placement in a sanitarium. These block are not the usual soffit type but are formed into a floor by means of 6-in. joists cast in place on 26 in. centers. Campbell Supply Co. produces other specialties, one of which is a 6-ft. x 2-in. thick reinforced concrete slab that is used in place of wooden planks at various points in iron ore mines of the Upper Peninsula.

A vigorous advertising campaign is carried on by the company and includes spot radio announcements. The company maintains a 12- x 40-ft. billboard on the major highway leading into the city. Direct mail pieces are sent to the company's twelve dealers in a 75-mile radius. Newspaper advertising is also used from time to time. The president of the company has a Cessna-170 airplane in which he contacts dealers frequently.

Officers of Campbell Supply Co. are: L. B. Frazier, president; Carl C. Clark, vice-president and plant manager; George Quinnel, secretary; and Anne Frazier, treasurer.

Mr. Frazier recently made the statement: "We, the industry, must mechanize—present methods of block production, curing, storage and loading require entirely too many man-hours." He continued by pointing out that block are handled individually about three times, and as a unit (in cubes or on a rack) at least three more times between the block machine and the outgoing truck or rail car shipment. Management of this company is thinking along lines of lessening the individual handling of block and has been experimenting for some years with various forms of conveyor systems. Ultimately, such a conveyor system will lead from machine to yard storage via some system of in-transit curing. Mr. Frazier indicated that at present some form of drag conveyor to carry block through a water-curing trough was being considered.

NEW MACHINERY

Industrial Fork Lift Truck

THE YALE & TOWNE MANUFACTURING CO., Philadelphia, Penn., has announced an industrial fork lift truck, powered by a diesel engine and equipped with a hydraulic transmission. Called the Diesel-Lift, this new truck is said to be specifically designed for applications where fire hazards exist, where there is a limited amount of fresh air, and in outdoor areas where continuous heavy-duty operation is a necessity. The truck is equipped with a condenser-type water muffler which screens out sparks in the exhaust gases for further safety.

Fork truck powered by diesel engine

Extends Lift Truck Line

CLARK EQUIPMENT CO., Industrial Truck Division, Battle Creek, Mich., has expanded its line of fork lift trucks with the pneumatic-tired Yardlift-150 for out-of-doors handling of 15,000-lb. loads. In spite of the machine's large size, it is said that easy maneuverability is achieved by use of a 22-in. diameter hand wheel which operates an hydraulic powered steering-control. In case of engine stoppage, the steering linkage can be operated mechanically.

Pneumatic-tired fork truck

Truck for Concrete Mixer

COOK BROS. EQUIPMENT CO., Los Angeles, Calif., has introduced a truck, which is designed exclusively to carry a concrete truck mixer. This truck, the M-10, has a 169-in. wheelbase and weighs 11,680 lb. The mixer shown on the truck, in the illustration, is a 6½-cu. yd. unit which weighs 7120 lb., and has a drum volume of 312 cu. ft.

Truck and concrete truck mixer

Truck Mixer

CONCRETE TRANSPORT MIXER CO., St. Louis, Mo., has in production both the Hi-Lo and Hi-Lo Jr. truck mixers. Featuring visible mixing action, the open top, stationary drum mixer with revolving blade action produces a kneading, folding and blading said to provide a homogeneous mix. These mixers can be installed on any truck chassis, and are operated by power take-off from truck transmission or are adaptable with separate engine drive.

Truck mixer with visible mixing action

Fork Trucks

THE BAKER-RAULANG CO., Cleveland, Ohio, has announced its line of Type FC center-control fork trucks, which are said to find application in plants where ruggedness and low maintenance are important and where stand-up drive is preferred. An automotive-type steering wheel is equipped with a steering knob to facilitate sharp turning and backing into position. The manufacturer states that another feature for ease and simplicity of operation is the one pedal which controls power and braking, an interlock cutting off the power when the brake is applied. Levers for controlling hoist, tilt, direction of travel and acceleration are located near the operator's right hand; they are clearly marked to help in reducing error.

Another Leader ★ IN THE PRODUCTS INDUSTRY PREFERS BESSER VIBRAPACS!

This is the 89th of a series of ads featuring leaders of the Concrete Products industry who are stepping up block production with Besser Vibrapac machines.

W. M. Stoner, Jr., Pres. of Western Concrete Products Co. with other company officials: W. M. Stoner, Sr., H. L. Sherwood, and R. Sherwood.

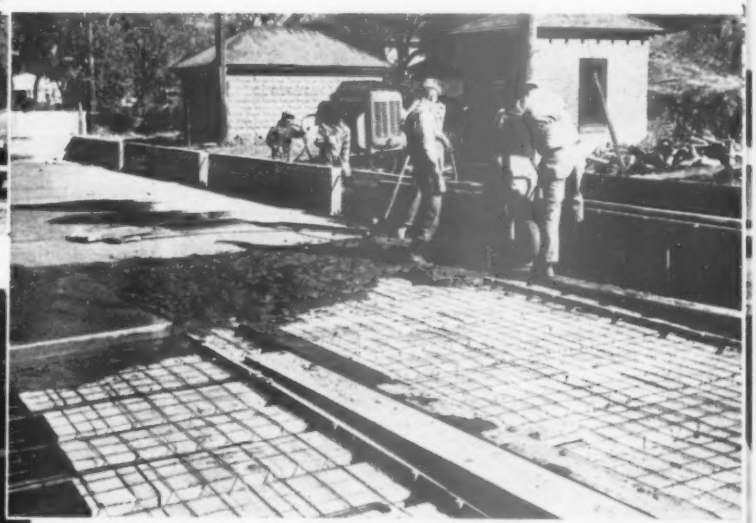
WESTERN CONCRETE PRODUCTS CO. of Lincoln, Nebraska is a subsidiary of Western Brick & Supply Co., which recently celebrated its Golden Anniversary. The company is one of the outstanding producers of concrete masonry units in the Middle West, operating Besser Vibrapac machines at both their Lincoln and Hastings plants.

For many years, Western Brick & Supply Co. manufactured common and face brick, but soon discovered the profit possibilities of supplying both brick and block. Today the two block plants manufacture more than a hundred types of block — including sand and gravel units, Haydite and pumice block, Soffit block and concrete brick — all made on the Vibrapacs. The market covers a radius of 300 miles. Due to the dependable day-in, day-out performance of the Vibrapac machines, plus an unusually aggressive promotional program, production of block has been stepped up to 3½ million 8" equivalents, annually.

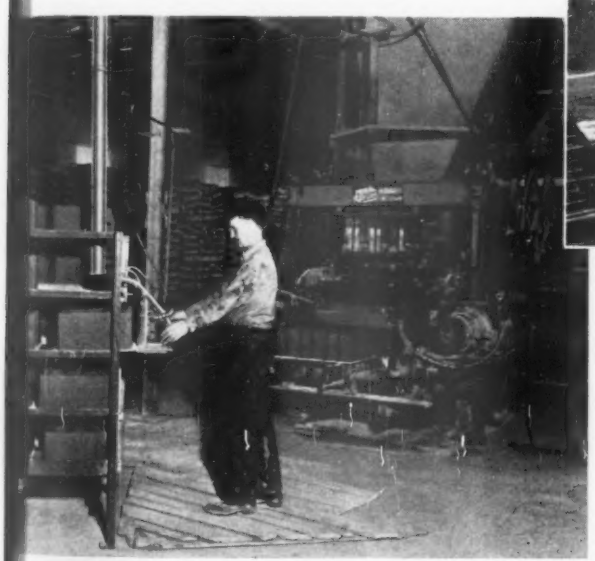
BESSER MANUFACTURING CO., Alpena, Mich., U.S.A.

Complete Equipment for Concrete Products Plants

Exterior view of the Western Concrete Products Company's plant at Hastings, Nebraska.

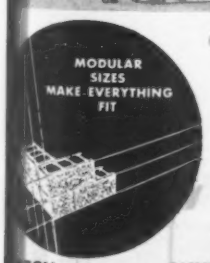


Typical job where Soffit floor units were used, produced on Vibrapac machines at the Western Concrete Products Co. plant. During the last 6 months of 1950, Western furnished 150,000 Soffit Block for floors and roofs, using 500 Acrow Telescopic Centers supplied by Besser.



Besser Super Vibrapac three-at-a-time machine at the Hastings plant. Fully automatic. No lifting. One man merely guides the power off-bearing hoist.

One of the many concrete brick homes in this area. All brick made on Besser Super Vibrapac.



BESSER

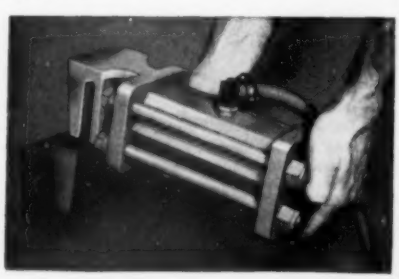
SKIP LOADERS | BLOCK & BRICK CUBERS | SUPER VIBRAPAC | SINTERING PLANTS | ACROW CENTERS | ROOF TILE MACHINE

"BRANFORD" Vibrators

Branford's Pneumatic Big 3 Offer Step-by-Step Savings For Concrete Products Plants

"BRANFORD" Car Shakeout Vibrator
Low cost portable shakeout that effectively unloads cement and other bulk materials from Covered Hopper-bottom Railroad Cars.

"BRANFORD" Hopper & Bin Vibrators
Eliminate destructive poking and sledging, assure instant flow from storage bins, weigh batchers and feeder hoppers.



"BRANFORD" L. D. Vibrator
Produces denser — smoother finished products. Quickly and easily moved about as required. Ideal for concrete pipe, burial vault, septic tank, or building forms.

Complete Catalog on request

NEW HAVEN Vibrator Company

145 CHESTNUT ST.
NEW HAVEN, CONN.

FORUM
ON CURING CONCRETE PRODUCTS

conducted by
WILLIAM J. SHORE

Question

Our steam curing process is definitely inadequate so we are sending you this description of our set-up in the hope that you might be of assistance to us.

We make 720 block units per hour with a vibrating machine. We have four kilns. These are 60 ft. in length, 9 ft. high and 12.5 ft. wide. There are sheet steel doors at each end of each kiln. We have a separate perforated pipe running the length of each kiln. This admits steam to the kiln.

We start our steaming at 6 p.m. because the boiler is used for other purposes during the day. When the block come out in the morning they are not especially warm and they still have a black color instead of the gray blue color of cinder block. We generally have to let them stand for 24 hr. before taking them off the racks, because they are not hard enough to take the rough handling.

What should we do to correct this condition?

Answer

We suggest the following: Remove doors at far end of kilns and block up. Install a false ceiling of lightweight construction with moistureproof membrane below and blanket insulation above. Replace sheet metal doors with insulated doors that fit tightly and snugly.

If it is desired to continue using the old boiler at night time, check on steam consumption per kiln and make sure that there is available for each block to be cured 2 lb. of steam. If there are 1000 block in the kiln, you should put in 2000 lb. of steam. If there are 2000 block, put in 4000 lb. of steam. Temperature should be brought up to 170 deg. F. and then maintained at that figure.

It may be that the old boiler is not of sufficient capacity, but the data given above should help you arrive at a satisfactory solution to your problem.

Bamboo as Reinforcement in Concrete

A REPORT on the practicability of the use of bamboo as a substitute for steel in reinforced concrete recently appeared in *Highway Research Abstracts*. Bamboo as a possible substitute for steel was first investigated during World War II, when it was studied in the laboratory and later tested in actual construction. The investigation brought out that the modulus of elasticity in tension varies between the limits of 2,000,000 and 4,500,000 p.s.i. The tensile strength of bamboo culm without a node is usually in the range of 26,000 to 50,000 p.s.i., calculated for the net section. Generally the node was found to be the weakest part of the culm in tension. Different species of bamboo showed marked variations in physical makeup.

The series of tests, intended for study of bond between concrete and bamboo reinforcement, was not completed, but was said to be sufficient to indicate the following: Bond stresses vary from a high value of 350 p.s.i. to a low of zero stress. High early strength concrete seemed to have merit in preventing cracks that would otherwise tend to result from swelling of the bamboo.

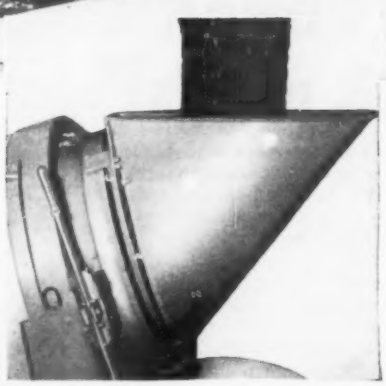
The test results indicated that bamboo reinforcement in concrete beams may be designed to carry safely loads from two to three times greater than that expected from concrete members having the same dimensions and no reinforcement. In general, the same procedure as used in designing conventional steel-reinforced concrete members was recommended for use in designing bamboo-reinforced units.

Concrete block plant display of Concrete Building Units Co., Kansas City, Mo., for the Kansas City Home Show

26 REASONS FOR BUYING the new lightweight BLAW-KNOX heavy-duty Hi-Boy TRUKMIXER

LITE-WEIGHT

THE new heavy-duty *Hi-Boy* has been redesigned to reduce the weight of the 3-yd. model by a full ton and the 4½-yd. model by half a ton, with no sacrifice of rugged construction or high-production performance. With this *lightweight Hi-Boy* you can haul rated loads within legal limitations—you can use a lighter, less expensive truck and so reduce your capital investment—you make more profit because you can haul *maximum* payloads at lower cost per yard. Get complete details from your nearest Blaw-Knox distributor.



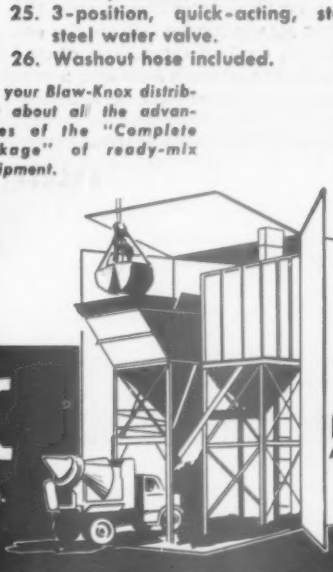
The REVOLVING HOPPER

This exclusive *Hi-Boy* feature means split-second charging . . . a flick of the latch turns the hopper a full 180° for fast, easy discharge of lowest slump concrete. Seal maintenance is reduced to near zero! It's the *only* rear-end seal that is never broken, that operates safely even when completely submerged in concrete.

Only the Blaw-Knox Hi-Boy has the hopper seal that is guaranteed for one year!

1. The lightest weight, complete, standard heavy-duty truck mixer.
2. Maintenance-free revolving hopper.
3. Hopper seal guaranteed for one year.
4. Single lever drum control operated from ground or walkway.
5. Single discharge control operated from ground or walkway.
6. Split-second charging through 32" unrestricted opening.
7. Complete end-to-end mixing, even of zero slump concrete.
8. Back-mixing if desired, with hopper in charging position.
9. Convenient quick visual inspection of batch before discharge.
10. Fast discharge without segregation, even with zero slump concrete.
11. Blade system that discharges entire batch without residue.
12. Quick-opening inspection hatch.
13. Fastest and easiest control of discharge.
14. Higher discharge—no confining chutes.
15. Easily replaceable mixing blades.
16. Grout-proof automatic water nozzle, properly located.
17. New silent, automotive transmission —the standard of comparison.
18. All metal clutches running in oil.
19. Finger-tip control for reversing drum rotation.
20. Extreme accessibility for maintenance or repair.
21. Double roller chain drum drive.
22. Clutch controlled V-belt driven water pump.
23. 2-compartment, splash-proof, tilt-proof automatic water measuring tank.
24. 2-compartment flush tank.
25. 3-position, quick-acting, stainless steel water valve.
26. Washout hose included.

Ask your Blaw-Knox distributor about all the advantages of the "Complete Package" of ready-mix equipment.



A COMPLETE READY-MIX OUTFIT IN ONE PACKAGE from BLAW-KNOX

Material Handling and Storage, Batching Truck Mixers

BLAW-KNOX

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● *Seberger's Concrete Block Co., Gary, Ind., recently enlarged their plant by adding two 74' 18" Farquhar Model 346-2 Sectional Trough Conveyors to feed 250-ton storage hopper. This plant uses one portable and six permanent Farquhar Conveyors in all. (See quotes from letter, below.)*

"We look to FARQUHAR for our CONVEYOR needs!"

Here are quotes from a letter Farquhar recently received from Seberger's Concrete Block Co., Gary, Indiana: " In 1950, we completed 25 years of cement block manufacturing. As our facilities grew, we looked continually to your company to satisfy our conveyor needs. The satisfaction gained since our initial purchase 14 years ago (this first conveyor is still being used to feed our crusher hopper) has been always reaffirmed in subsequent purchases.

"Farquhar Conveyors are ideally suited to our operations, providing high capacity units at reasonable investment and subsequent low maintenance cost. Your service facilities have always been excellent. We certainly recommend Farquhar Conveyors to anyone with a materials handling problem."

THIS MANUFACTURER echoes the sentiments of thousands of builders, manufacturers, coal operators and other industries and businesses who find bulk or package materials handling a problem!

Farquhar offers you a *complete* line of conveyors for portable semi-permanent or permanent use, to handle any and all kinds of loose or packaged materials. There's a Farquhar conveyor that can *save you money!*

WORLD'S MOST COMPLETE CONVEYOR LINE

WRITE for complete information on Farquhar Conveyors to A. B. FARQUHAR CO., *Conveyor Division,* Dept. V-28, 142 N. Duke St., York, Pa., or 618 W. Elm St., Chicago 10, Ill.

HYDRAULIC PRESSES • FARM EQUIPMENT • FOOD PROCESSING AND SPECIAL MACHINERY

Graduate Fellowships

TWO GRADUATE FELLOWSHIPS sponsored by the National Sand and Gravel Association at the University of Maryland are available, starting with the 1951-1952 academic year. Also, a graduate fellowship, the Stepanian Fellowship, sponsored by National Ready Mixed Concrete Association at the University of Maryland, is available for the 1951-1952 academic year, and a second one, the "Dolly" Gray fellowship, will be available for 1952-1953. The two associations have had provisions for sponsoring such fellowships since 1940, but so far only two students have completed their graduate work with the associations' help. The lack of fellows has resulted from the shortage of qualified graduate students during the war years and the postwar period and the reduced attractiveness of fellowship stipends to government-financed G. I. students.

Concrete Bulletins

THE RESEARCH AND DEVELOPMENT Laboratories of the Portland Cement Association recently announced the publication of Bulletins 35 and 36, "Linear Traverse Technique for Measurement of Air in Hardened Concrete" and "Soniscope Tests Concrete Structures." The bulletins are authorized reprints from copyrighted *Journal of the American Concrete Institute.*

Bulletin No. 35, written by L. S. Brown and C. U. Pierson, describes a method of measuring entrained air in hardened concrete that can be used in studying the performance of old concrete structures as well as laboratory specimens of test concrete. The method described permits the examination of 6- x 8-in. and 6- x 10-in. random plane face-ground hardened concrete specimens which are said to more truly represent the aggregate and air voids in the actual concrete than smaller specimens. The construction and use of the instruments are discussed and results of tests are given. Because of the time and equipment necessary to measure air content by means of the integrator, it is not adaptable to field use but, as a laboratory tool, it is said to provide a means for quick and accurate determination of total air.

Bulletin No. 36, written by E. A. Whitehurst, tells how the Soniscope, an instrument which measures group velocities through as much as 50 ft. of concrete, was used for the field testing of 13 bridges, one navigation lock, 14 dams and five highway pavements in 12 states. Repeated tests permitted study of changes in the condition of the concrete and the development of group velocities indicating the condition of the structure. The value of the results increases with knowledge of the materials, mix design, method of placement and other characteristics of the structure being tested.

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PORTABLE
MORTAR
MIXER

Worthington-Ransome 6 cu ft mortar and plaster mixer

No other mixer has so many time-saving, cost-saving features

FAST, THOROUGH MIXING by six high-carbon steel mixing blades and four stationary blades securely mounted on paddle. Blade design automatically keeps bowl clean.

FAST DISCHARGE. Drum can be emptied in 4-5 seconds.

EASY, CONVENIENT, SAFE OPERATION. Single lever operates speed reducer—no clutches. Bag cutter located on protective grill. Bag platform on 20° angle helps avoid spilling. Bowl lock prevents accidental dumping while mixing.

EASY SAFE TOWING. Towing bail lifts leg stand 'way up—can't be damaged by roughest terrain.

SEE THIS MIGHTY MIXER AT YOUR WORTHINGTON DISTRIBUTOR, or write for bulletin to Worthington Pump and Machinery Corporation, Construction Equipment Division, Dunellen, N. J.

FAST • COMPACT
EASY-HANDLING • SAFE
Can Keep 30 Men Working at Top Speed.

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Follow the KENT Continuous Mixing Trend to GREATER PROFITS!

WRITE FOR BULLETINS Describing All 3 *KENT* Continuous Mixers

The KENT Continuous MIXER receives material *continuously*, mixes it *continuously* and delivers it *continuously*.

The operator SETS it—STARTS it and LEAVES it—to devote his time to other important work.

The tremendous American output of goods, never even remotely approached anywhere in the world, has been due in large measure to straight line production.

When this advanced method was first gaining acceptance Kent machines were already applying this principle in the continuous mixing of concrete.

Each year since then Kent Mixers have been accorded wider acceptance as block manufacturers have applied more efficient methods to their production problems.

Today more and more of them are turning to Kent Continuous Mixers both to increase their output and to more effectively meet competition through lowered costs. Three sizes are now available to meet all demands—including the very largest block machines.

Isn't it time for you to hear the complete story, especially since you can get it quickly, clearly and without obligation?

The KENT MACHINE CO. Cuyahoga Falls, Ohio
Manufacturers of **CONCRETE PRODUCTS MACHINERY** *Since 1925*

At Left: The Model 480-P with pneumatic tires is only one of the new line of trucks that incorporate many NEW engineering features.

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Now! Mass Handling gets a shot in the arm! Man power gets a big boost in productive efficiency. Towmotor, always the leader, has developed a new line of fork lift trucks that were the hit of the show. This new series includes pneumatic, cushion, and solid tire units, and offers many new engineering refinements to all types of industry to help speed production and cut handling costs. If you did not see this outstanding line of trucks at the 4th National Materials Handling Exposition, write today for a copy of the new brochure, "The Star of the Show."

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HOW MANY PEOPLE HAVE YOU TALKED TO ABOUT ***AMERICANISM*** *TODAY?*

Conference on Concrete

A CONFERENCE on practical concrete problems was held May 4, 1951, at the University Extension Center, San Francisco, Calif. It was presented by the Division of Engineering Extension and Department of Conferences and Special Activities, in cooperation with the Associated General Contractors of America, the Portland Cement Information Bureau and local members of the American Concrete Institute. The conference was decided upon after a number of complaints, concerning previous discussion panels at conventions, indicated that the tendency was toward too much technical discussion rather than of everyday concrete problems. Accordingly, a program was arranged to discuss specific concrete problems. Approximately 300 attended the conference and it was such a success that there was an almost unanimous request for additional meetings, and also requests for similar meetings in other areas.

Atomic Energy Concrete Plant

IT WAS RECENTLY REPORTED in *Western Construction* that the Reactor Testing Station of the Atomic Energy Commission in Arco, Idaho, has four building projects underway, each project representing several millions of dollars. The individual projects are separated by several miles and spread over an area of some 430,000 acres, and the need of supplying concrete to all projects presented a difficult problem, due to the remoteness of the Reactor Testing Station from established ready-mixed concrete plants. It was decided that a consolidated plant, operating under the direct supervision of the Idaho operations office, would be the only feasible solution. This would make it possible to obtain uniform and adequate control of concrete quality. Accordingly, all architect engineers were instructed to specify concrete by compressive strength required, rather than by mix.

A surplus concrete batching plant was purchased from the A.E.C., Hanford, Wash. The layout consists of a Noble No. 150 dual batch plant with a 225-ft. inclined Link-Belt conveyor which is fed by a horizontal conveyor running under four charging bunkers. A 3-cu. yd. Smith tilting mixer with a 75-cu. yd./hr. capacity is installed in one side of the dual plant, the other side being used for dry batching. Storage facilities are available for 6000 bbl. of cement. A 7-ft. dia. reclaiming tunnel, 200 ft. long, was installed, complete with six air-controlled discharge gates, horizontal conveyor belt, plus an inclined belt to dump aggregate into the bunkers of the plant. The six discharge gates feed the conveyor from three stockpiles which were staggered over the tunnel. Steam coils were installed to permit winter operation. By the end of last February, 32,363 cu. yd. of

concrete had been produced. A fleet of more than 20 truck mixers is available to haul concrete from the central plant to the various locations.

General supervision of concrete producing facilities at the site, as well as all construction, is the responsibility of the Construction Branch, headed by J. Warren Evans. The Construction Branch is under Allan C. Johnson, director of the Division of Engineering and Construction. The entire installation of the Reactor Testing Station is headed by L. E. Johnston, manager, Idaho Operations Office, with headquarters in Idaho Falls.

To Make Septic Tanks

CEMENT PRODUCTS CO., Columbus, Ind., has announced that it will soon be producing septic tanks. The tank is rectangular in shape and has a liquid capacity of 520 gal. A 22-in. diameter manhole has been provided in the top to facilitate cleaning. The tank was designed by A. F. Spurgin.

Montana Producers Meet

MONTANA READY MIXED Concrete Association's recent two-day convention was attended by some 50 ready-mixed concrete operators, representing 15 Montana firms. A. W. Jones, bridge engineer, and L. H. Richter, assistant materials engineer, both of the Montana highway department, gave talks and led discussions on highway problems, as pertaining to sand, gravel and ready-mixed concrete.

At the general business session, George Jacoby, Helena, was elected president for 1951, succeeding Floyd Pappen of Great Falls. Other officers elected were Adolph Bromgard, vice-president, and Eugene A. Fehlig, secretary-treasurer. Oscar Peterson, C. B. Nicely and Mr. Bromgard were named directors.

Concrete Masonry Tests

THE NATIONAL BUREAU OF STANDARDS recently announced the publication of a report on "Fire Resistance of Walls of Gravel-Aggregate Concrete Masonry Units," written by Harry D. Foster, Earl R. Pinkston and S. H. Ingberg. It is the bureau's Building Materials and Structure Report, BMS-120.

The 17-page report gives fire-resistance test results for 12 walls constructed of gravel-aggregate concrete masonry units. Calcareous aggregates comprising mainly limestone and dolomite were used in making the units for five of the tests walls. The units used in the other seven walls were made with siliceous aggregates. The construction included 4-in. non-load-bearing partitions and 8- to 12-in. load-bearing walls. Hose-stream test results for three of the walls are given, and tables, graphs, diagrams and pictures are included. The report may be obtained for $.15 per copy from the Government Printing Office, Washington 25, D. C.

The added payload earns more for Jaeger owners

Jaeger engineering has eliminated as much as 1600 lbs. dead weight from truck mixers*, cut their loading time to only 10 seconds per yard, shortened discharge time to 20-25 seconds with 4" slump material, only 60 seconds per yard with 1" slump—and cut by 50% the usual time and cost of maintenance.

Hauling full payloads, on faster schedules, Jaeger truck mixers consistently produce more yardage—earn more profit for their owners—and for that reason outnumber all other truck mixers in use today.

**Engineered, not stripped, to save weight.* No reduction in thickness of drums, blades and load-supporting members.

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AGGREGATE SPREADERS • BITUMINOUS PAVERS • CONCRETE SPREADERS, FINISHERS

1 of 10 Reasons Why UNIT is a Better Machine

The UNIT 1020 — ¾ Yard Shovel furnishes economical and dependable service on every digging operation. Constructed to operate as a complete unit, its fewer working parts reduce replacement, operating, and maintenance costs.

Drop-forged parts are used throughout in the construction of UNIT equipment. Forgings are remarkably free of concealed defects and have fatigue-resistant qualities which assure uniform toughness in these parts. The front legs of the "A" frame and the end connections are one-piece drop-forgings, built to withstand the great strains imposed in digging or lifting operations. Forging also imparts a flawless grain structure to steel, thus giving it greater strength to accommodate enormous compressive stresses. For this reason, ALL spur and bevel gears, boom-hoist worm, power take-off drive worm, turntable hook-rollers, crawler-rollers, and many other equally important parts, are drop-forgings on UNIT Cranes and Excavators.

7th of a series of 10 ads describing outstanding UNIT features.

UNIT CRANE & SHOVEL CORP., 6431 W. Burnham St., Milwaukee 14, Wis., U.S.A.

Crawler and Mobile models — ½ and ¾ Yd. Excavators. Cranes up to 20 tons capacity.

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Prestressed Concrete Conference

THE FIRST U. S. CONFERENCE on prestressed concrete will be held August 14-16, 1951, at Massachusetts Institute of Technology, Cambridge, Mass., as was recently announced by Prof. Myle J. Holley, Jr., associate professor of civil engineering at M.I.T., who is the conference coordinator. Co-sponsors cooperating with M.I.T. include American Concrete Institute, American Institute of Architects, American Railway Engineering Association, American Society of Civil Engineers, Associated General Contractors of America and Portland Cement Association.

The purpose of the conference is to outline the present status and potentialities of prestressed concrete in American practice. The program has been tentatively outlined as follows:

Tuesday morning session:

Registration, 9:00; welcome address, by Dr. John B. Wilbur, Dept. of Civil and Sanitary Engineering, M.I.T.; a talk by L. H. Corning of P.C.A., on "Why Prestressed Concrete"? "Tanks," by Curzon Dobell, Preload Enterprises, Inc., New York, N. Y.; "Pipes," by J. G. Hendrickson of the A.C.P.A.

Tuesday afternoon session:

"Bridges," (survey of European experience), by C. C. Zollman, Prestressed Concrete Corp., Kansas City, Mo.; "Bridges," (survey of U. S. experience), by S. S. Baxter, Bureau of Engineering Surveys and Zoning, Dept. of Public Works, Philadelphia, Penn., R. H. Bryan, Bryan and Dozier, Nashville, Tenn., Mr. Johnson of Clark, Johnson and Anderson, Pontiac, Mich., K. H. Middendorf, Prestressed Concrete Corp., Kansas City, Mo., and F. W. Panhorst, State Division of Highways of California.

Tuesday evening session:

"Buildings," by J. K. Gannett, The Austin Co., Cleveland, Ohio; "Pavements," by L. Coff, consulting engineer, New York City, and B. F. Friberg, Granco Steel Products Co., Granite City, Ill.

Wednesday morning session:

"Piles," by A. E. Cummings, Raymond Concrete Pile Co., New York,

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N. Y.; "Mass-Produced Units," by K. P. Billner, Vacuum Concrete Corp., Philadelphia, Penn.

Wednesday afternoon session:

"Concrete," by H. L. Kennedy, Dewey and Almy Chemical Co., Cambridge, Mass.; "Wire," by H. J. Godfrey, John A. Roebling's Sons Co., Trenton, N. J.; "Bars," by Donovan Lee, consulting engineer from London, England.

Thursday morning session:

"Design" (general considerations), by M. Fornerod, Preload Enterprises, Inc., New York, N. Y.; "Design" (basic concepts), by T. Germundsson of the P.C.A.; "Design" (continuous spans), by G. H. Paris, A. L. Parme, of the P.C.A.

Thursday afternoon session:

"Research" (general discussion), by Dr. C. P. Siess, Dept. of Civil Engineering, University of Illinois, Urbana, Ill.; and several reports on specific research projects by leading engineers from various companies.

High-Pressure Steam Curing

SHORE ENGINEERING, New York, N. Y., recently issued a bulletin on "New Steam Curing Systems for Concrete Block." The bulletin presents new and pertinent facts that indicate improved operation of the curing process through the use of high-pressure steam generators in place of the common practice of using low-pressure steam.

The design and construction of kilns and doors in their relation bearing to the amounts of steam and heat demanded to complete operation, and on the quality of the finished block are covered in the bulletin. Shore Engineering includes plans and data for the construction of improved kilns and doors. Several illustrations also show additional advantages of high-pressure steam generation. Copies of the bulletin may be obtained from Shore Engineering, 320 Broadway, New York 7, N. Y.

A.C.P.A. Short Course

AMERICAN CONCRETE PIPE ASSOCIATION has announced that a short course of instruction on concrete sewer and culvert pipe will be held at the Edgewater Beach Hotel, Chicago, Ill., November 26-28, 1951. The purpose of the course is to instruct on the fundamentals and latest developments in the principles of design, manufacture and marketing of concrete sewer and culvert pipe.

The course of instruction, where possible, will be illustrative, while other topics will be covered by lecture. Among some of the subjects to be covered are: Hydraulics of Culverts and Sewers; Bedding, Backfilling and Design of Concrete Pipe; Preventing the Generation of Hydrogen Sulfide; Concrete Mix Design; Curing of Concrete; Economics of Concrete Pipe; Special Uses and Special Methods of Installation. A registration fee of $30 will be charged to cover the cost of classrooms, materials, literature and guest lecturers.

N.C.M.A. Meetings

THE BOARD OF DIRECTORS of National Concrete Masonry Association held their annual mid-year meeting at the Edgewater Beach Hotel, Chicago, Ill., June 25-26, 1951. Prior to that, the Publications and Publicity Committee met June 24 at the Edgewater Beach Hotel and the Technical Problems Committee met in Oklahoma City, Okla., at the Skirvin Hotel, June 22-23. The main feature of these meetings was a review and discussion of the various technical and promotional activities of the association.

Block Plant to Expand

JEROME CINDER PRODUCT CO., Jerome, Idaho, will build a new office building and a 28- x 80-ft. storage building during 1951, as recently announced by Vic Camozzo, company manager. He also stated that the new, patented Mediterranean block now being produced by the company is boosting sales and outlets all over the West. Expansion plans for 1951 also call for increased production of the block.

MULTICO BLOCKMASTERS

they've got everything!

MULTICO BLOCKMASTERS *have got* everything the modern operator wants. Multiplex engineers build FULLY AUTOMATIC machines with a compression action unavailable elsewhere; a combination of VIBRATION, TAMPING AND PRESSURE for perfect blocks. They chose HYDRAULIC POWER for smoothness of action and originated the idea of making a SEPARATE POWER PAK CONTROL unit for easy maintenance and simplicity of design. The Blockmasters have INDIVIDUAL MOLD BOXES for instant block-style change, coupled with PLAIN PALLETS for making ANY SIZE and ANY SHAPE of block out of ANY AGGREGATE. Both of these TWO MACHINES, the 2-block cycle MULTICO No. 2, and the 3-block cycle MULTICO No. 3, have STANDARD REPLACEMENT PARTS.

This is what John P. Kocak, Manager of the Lorain Crystal Ice Company, Lorain, Ohio, wrote us—

"It (MULTICO No. 2) has given us very good results, the block being the best we ever produced; they're dense, sharp, and test beyond requirements. Production is at a rate of between 450 to 480 block per hour."

Multiplex engineers want to help you plan your plant expansion, and can offer you the automatic block machines, mixers, skip hoists and compartment aggregate bins that are required for successful plant operation.

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TWO YEARS of Successful Operation with ELECTRO VISOR Automatic Quality Control by 17 Leading Block Manufacturers can mean...For You

Increased Production . . . up to 17 blocks per minute
Controlled Height . . . to 1/32 of an inch
Controlled Density . . . to 4 oz. with most materials

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